



# ***Dells of the Wisconsin River State Natural Area***

*Master Plan and  
Environmental  
Assessment*

Wisconsin Department of Natural Resources  
January 1997

Photo by Thomas A. Meyer

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*"We cannot remove  
places to our homes,  
but they cut them-  
selves into our  
memories and  
remain pictured  
in us forever."*

*Naturalist John Muir,  
after visiting the Dells  
in the 1860's*

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## I. EXECUTIVE SUMMARY

The Dells of the Wisconsin River State Natural Area was created in September, 1994 when the Department of Natural Resources purchased 1,050 acres from the Dells Boat Company for \$2.9 million. The Dells Boat Company, a subsidiary of the Wisconsin Alumni Research Foundation (WARF), offered to sell the property to the Department in 1993 for less than market value to assure its long-term preservation.

The Wisconsin Dells is well known as a tourist destination that was built on private boat tours that began in the 1880's. The area became recognized internationally as its scenic resources were displayed through the photography of Henry Hamilton Bennett. The region possesses a rich history, and the long-term preservation of this property is the end result of early conservation efforts begun in the 19th century.

The natural area contains a mosaic of natural community features including northern and southern oak/pine forests, oak savanna, and moist and dry cliffs. Outstanding examples of Cambrian sandstone exposures--the cliffs, rock formations, and glens that embody "the Dells"--are especially abundant. They also harbor several plant species, such as Lapland rosebay, fragrant fern, and cliff cudweed, that are very rare in Wisconsin. These remnant populations exist today in the heart of an extremely busy tourist area, making their protection especially significant.

The natural area currently includes more than five miles of Wisconsin River corridor in the Upper and Lower Dells. The boundary for the project includes a total of 2,115 acres of land which will expand current state ownership by 1,065 acres (Figure 1). Purchase of the additional lands would facilitate protection of habitat types unique to the Dells area, connect the property to nearby state lands at Rocky Arbor State Park and Camp Upham Woods, and create a buffer for greater protection of natural area values.

The master plan for this property calls for long-term management activities that will maintain and enhance the rare natural and scenic qualities of the natural area while allowing compatible public uses. This approach calls for a low-impact management philosophy for the entire natural area.

Vegetation management (Figure 2) within the natural area will focus primarily on enhancing natural community features while also allowing for natural processes to proceed. Overgrown oak savanna will be restored to pre-European settlement conditions. Management activities will include prescribed burning, herbicide treatments, and removal of exotic and invasive species. Pine plantations will be thinned to approximate the composition of adjacent natural stands. Other areas of the property will be left to allow natural processes to proceed.

Deer hunting on the natural area will be an important tool to manage the deer population and minimize damage to vegetation. Small game hunting and deer hunting with bow and firearms will be allowed on the property in accordance with statewide regulations. A significant portion of the natural area is within the Wisconsin Dells city limits. Consequently, there can be no discharge of firearms in this area in accordance with a local ordinance. Bowhunting for deer by permit is being considered by the city within its political boundaries. Spring

turkey hunting will be open for the first three seasons and will normally close by May 1. The shortened turkey season will minimize conflicts with hikers in the spring. Implementation of the abbreviated turkey season may require amending Administrative Rules.

A primary objective of State Natural Areas is to afford opportunities for nature interpretation and education. The natural area will provide such opportunities through an interpretive hiking trail, informational kiosks, guided tours, education partnerships, and educational materials. Also feasible is a natural area display in conjunction with the H.H. Bennett Museum in Wisconsin Dells.

Compatible public uses that will be allowed in designated parts of the natural area are hiking, cross country skiing, bird watching, hunting, trapping, sightseeing, nature study and other low intensity uses. Visitors will be limited to foot travel only. Access to the property will be controlled by providing a limited number of access points, planning for use at identified locations, and establishing closed zones. Designated public use areas will include a day-use area at the Cambrian Overlook and a two-mile loop hiking trail at Chapel Gorge. Each of these areas will have a parking area. An additional parking area will be located at the Crandall Pines.

Closed zones will be located in the uplands along the river corridor and canyons on both sides of the river to ensure protection of fragile geological features, rare plants, natural communities, and other sensitive resources. These zones will be closed to all visitor use. Along the Wisconsin River, the zones will average two-hundred feet in width, with a minimum width of seventy-five feet. In some locations the zone may be wider than two-hundred feet. The width of the zones will be determined by topography and the location of sensitive resources to be protected. In the tributary canyons, the width will average about fifty feet. Areas of the property that are not in a closed zone will generally be open for public use.

The river corridor and adjacent sandbars will remain open to the public. Boat traffic on the river is very heavy during the summer season and is a cause of concern for safety and user conflicts. Resolution of this issue is beyond the scope of this master plan. However, recommendations have been made to provide strong water-based law enforcement and education to resolve some of these problems.

Camping, fires, use of charcoal grills, and glass containers will be prohibited on the natural area. Refuse management will consist of a carry in/carry out policy. There will be no trash collection. Implementation of these policies will require an addition to Administrative Rule NR 45.

The property will have closed hours applicable to the sandbars as well as to the uplands, the areas located away from the river corridor. The closed hours are from 10:00 P.M. to 5:00 A.M. during May 15 to Sept. 15. Other times of the year the property will be closed from 8:00 P.M. to 5:00 A.M. The closed hours will also need to be stipulated in Administrative Rule NR 45.

A condition of the sale of the property to the State stipulates that the Department lease three areas comprising fifty-five acres back to the Dells Boat Company. The fifteen-year



renewable lease allows the lessee continued use of commercial boat tour shore landings at Coldwater Canyon, Witches Gulch, and Stand Rock.

The total estimated cost to acquire all lands and lower-value improvements within the boundary is \$1,980,500. Lower-value improvements are generally defined as buildings less than \$50,000 in value. The Department's policy is not to purchase higher-value improvements. The projected annual cost of operating the property is expected to average \$75,000. This cost may vary depending on the types of management activities undertaken in a given year. Costs to develop the public use facilities and administrative support facilities recommended in this plan are estimated to be \$265,600 in 1996 dollars. The Department currently makes annual payments in lieu of taxes on this property approximating \$76,548. This figure will increase by \$52,216 annually if the Department acquires all land within the project boundary.

This plan was completed with assistance from an 18-member Citizen Advisory Committee, a Department of Natural Resources Master Plan Task Force, and general citizen input. The latter included public attendance at the advisory committee meetings, three public open houses, contacts with all landowners within the boundary, and three surveys soliciting public input. Public input has been instrumental in the selection of the management options outlined in this plan.

## II. GOAL STATEMENT AND OBJECTIVES

### *Goal*

Preserve the natural and scenic qualities of the Dells of the Wisconsin River, with special emphasis on protecting fragile geological formations and native plant and animal communities; provide interpretive and educational information; and accommodate compatible recreational opportunities for the public.

### *Objectives*

- Protect, maintain and restore natural biotic communities, with particular emphasis on the rare, endangered and threatened species found there.
- Protect, maintain and enhance the scenic beauty of the river corridor and canyon areas.
- Conduct ongoing inventory and research regarding those areas of archaeological, geological and biological significance.
- Participate with private and local government partners to reduce water use conflicts in the Upper and Lower Dells in order to provide a safe recreational experience.
- Provide opportunities for low-impact recreational uses (such as hiking, nature study, and hunting) compatible with resource protection.
- Provide education, interpretive and research opportunities and participate in cooperative efforts for appreciation of natural, cultural, and historical resources.
- Meet lease obligations with lessee to sustain high-quality commercial boat tours and ensure proper management of the leased areas.
- Manage timber resources through selective harvesting to promote old-growth forest in the pine plantations.
- Accommodate deer hunting as a management tool to limit impacts to native vegetation, crops, and ornamentals.

### III. BACKGROUND INFORMATION

#### A. Cultural History and Resources

The cultural history of the Wisconsin Dells area is estimated to span several thousand years. Various Native Americans, ranging from early Paleo-Indian people to the more recent Ho-Chunk (formerly called the Winnebago), Sac (Sauk) and Menominee, were attracted to the scenic waterway, and left behind archeological evidence such as effigy and burial mounds, camps and village sites, garden beds and rock art. Many of these historic resources have since been destroyed by the modern practices of farming, dam construction, road building and community development.

Local Dells lore recounts Chief Black Hawk of the Sauk nation hiding in area caves to evade U.S. troops after the massacre of his people at the Battle of Bad Axe in 1832. Shortly after the Black Hawk incident the federal government began its removal policy of forcefully resettling all Native Americans west of the Mississippi River. The result of this policy significantly opened up the Wisconsin River valley to European and Yankee settlement.

An attempt to expel the Ho-Chunk tribe failed, however, as many of the people slipped back to their Wisconsin homeland. Today, the Ho-Chunk descendants are a considerable economic force and the largest employer in the Dells area, managing a gambling casino in nearby Lake Delton.

Prior to Department acquisition, there were only three recorded archeological sites within the property boundary. Investigations conducted during the spring of 1996 revealed seven additional sites, including rock art, prehistoric Indian artifacts, and a more recent historical kiln and a stone cave/cellar. Some of these sites are classified as extremely sensitive. There is high probability of additional undiscovered sites on the property. Exact locations of archeological sites are exempt from open records laws and are considered confidential.

During the 17th century, European traders, trappers and missionaries also discovered the Wisconsin River as a primary transportation route. By the 1830's rich timber resources in northern Wisconsin attracted lumbermen who harvested the old-growth forests and floated the logs down the Wisconsin River to a waiting market. The narrow, seven-mile long gorge where the river cuts through tall sandstone cliffs, called the "dalles" by early French traders, was the site of regular log jams and harrowing experiences for the raftsmen.

Permanent settlement started around 1853 at the "Lost City of Newport," two miles downstream from the current city of Wisconsin Dells. When the railroad by-passed Newport in 1856 in favor of a river crossing to the north, a new settlement called Kilbourn City began at the site of the present community. It was renamed Wisconsin Dells in 1931 as a tactic to promote tourism.

The river provided early opportunities for local economic growth -- but not without other consequences. Damming of the river began in 1856 to generate water power for the settlement. The present Kilbourn Dam was completed in 1909, and still serves the area with electrical power. However, the dam reportedly raised the water level sixteen feet, inundating

numerous striking geologic features and landmarks in the Upper Dells. The difference in water level today between the Upper Dells and Lower Dells measured as dam head is twenty-one feet. This action also quelled attempts to designate the area as a state park. John Nolen, a nationally-renowned landscape architect, had recommended park status in 1909 in a report suggesting four outstanding locations for state parks. The State Park Board responded by establishing three sites as Peninsula, Wyalusing and Devil's Lake State Parks, but chose not to acquire the Dells of the Wisconsin River because of the extent of damage and development that had already occurred.

About the same time, tourism began to flourish. The Dells received international attention as a vacationland after photographer H. H. Bennett circulated photographic images of the picturesque river and rock formations (see title page). Tourism soon became the leading economic activity, as it remains today.

Realizing the crush of tourists could endanger the Dells' natural beauty, Bennett's son-in-law, George Crandall, gradually acquired ownership of as much riverfront property as possible. He reforested many acres of cut-over land adjacent to the river, and created a plantation of 140,000 red pines that remains today. After Crandall's death, his daughters, Lois and Phyllis, in 1954 donated the amassed property to the Wisconsin Alumni Research Foundation (WARF) of the University of Wisconsin. It has since been managed and protected by the Dells Boat Company (recently reorganized under the name Dells Boat Tours, LLC), a subsidiary of WARF. The Department of Natural Resources (DNR) purchased the 1,050-acre property from WARF in 1994.

Protective private ownership has kept development of the highly desirable landscape to a minimum. As a result, there are few cultural features along the immediate river corridor that reflect human presence during the more recent historic period. The Cambrian Lodge, a former resort on the west side of the river, and the Sunset Cabins Resort on the river's east shore have been determined by the Wisconsin State Historical Society (WSHS) to lack sufficient significance to warrant special consideration as historical resources. No known historical structures other than the kiln are still present within the property boundaries, according to the WSHS's Inventory of Historic Places.

After visiting the Dells during the 1860's, the great naturalist John Muir wrote, "We cannot remove places to our homes, but they cut themselves into our memories and remain pictured in us forever." With the Dells of the Wisconsin River State Natural Area under state ownership, it will continue to remain protected for future generations.

## **B. Regional Analysis**

### **1. Location and Regional Significance**

The Dells of the Wisconsin River State Natural Area is located in south central Wisconsin at the junction of Adams, Columbia, Juneau and Sauk counties. Its location along Interstate 90 & 94 and major state highways 12 & 16 makes it easily accessible from many points in the Midwest. The Amtrak rail also serves the City of Wisconsin Dells. Major cities such as Minneapolis, Chicago, Madison, and Milwaukee are within one to four hours drive of the Dells. Wisconsin Dells remains among the Midwest's most popular family vacation

destinations. According to the Wisconsin Dells Area Convention and Visitor Bureau, over 50 percent of visitors come from out of state, of which 37 percent are from Illinois.

It is expected this natural area property will complement the large tourism industry in the region. The City of Wisconsin Dells features over seventy-eight attractions, ninety restaurants, one-hundred retail businesses, 5,800 lodging rooms, and 4,050 campsites that accommodate the over 50,000 daily visitors. Travel and tourism account for an annual \$5.7 billion industry for the State of Wisconsin, of which \$243 million is generated by Wisconsin Dells area businesses.

## **2. Geological and Ecological Significance**

The unique combination of geological and biological features found in the Dells is unusual in the Midwest region and scarce nationally. The sandstone cliffs in the valley of the Kickapoo River in Vernon and Crawford counties are geologically similar to the Dells, and the Dalles of the St. Croix River between Wisconsin and Minnesota at Interstate State Park are somewhat comparable in appearance but were formed under different circumstances and are composed of different rock types.

High-quality examples of some of the native plant communities found in the natural area are uncommon in the state. Some of these communities, such as northern dry-mesic forest with red and white pines, are typically found far to the north. Of special significance are the shaded and exposed cliffs which harbor several species of rare plants. Although similar cliffs are found nearby at Parfrey's Glen and Pewits Nest State Natural Areas in Sauk County, the extent and diversity of the cliffs and cliff flora in the Dells is unmatched. The Dells contain the most significant populations of some rare plant species in the state. The geological and biological significance of the natural features located here is the primary rationale for the establishment of this natural area.

## **3. Public Recreational Lands in the Region**

Many other state-owned properties in this region have been established for a variety of purposes. State parks, fishery and wildlife areas, other State Natural Areas and the University of Wisconsin-Madison Extension Camp Upham Woods provide opportunities for camping, fishing, hunting, hiking, skiing, nature study and many other activities. It is expected the Dells of the Wisconsin River State Natural Area will afford a recreational niche not otherwise available in this area. Conversely, the natural area--established to protect sensitive resources that can be passively observed--does not have as pronounced a recreational mission as other natural sites. For example, camping is not available on the natural area, however, there are many places to camp at nearby Rocky Arbor State Park, Mirror Lake State Park and private campgrounds.

State-owned lands located nearby include:

- Rocky Arbor State Park - camping, hiking (open seasonally)
- Camp Upham Woods/Blackhawk Island - 4H camp owned by UW-Madison Extension, available for youth programs and nature study.
- Hulbert Creek Fishery Area - public fishing and hunting.

- Dell Creek Wildlife Area - public fishing and hunting.
- Mirror Lake State Park - camping, hiking, cross country skiing, fishing, deer hunting.
- Quincy Bluff State Natural Area - nature study, hunting
- Parfrey's Glen State Natural Area - hiking, nature study.
- Pewits Nest State Natural Area - nature study
- Devils Lake State Park - camping, hiking, skiing, fishing, deer hunting.
- Plainfield Creek Fishery Area - fishing and hunting.
- Pine Island Wildlife Area - dog training, fishing and hunting.
- Sohlberg Silver Lake State Natural Area - nature study, hiking.

#### **4. Land Use and Zoning**

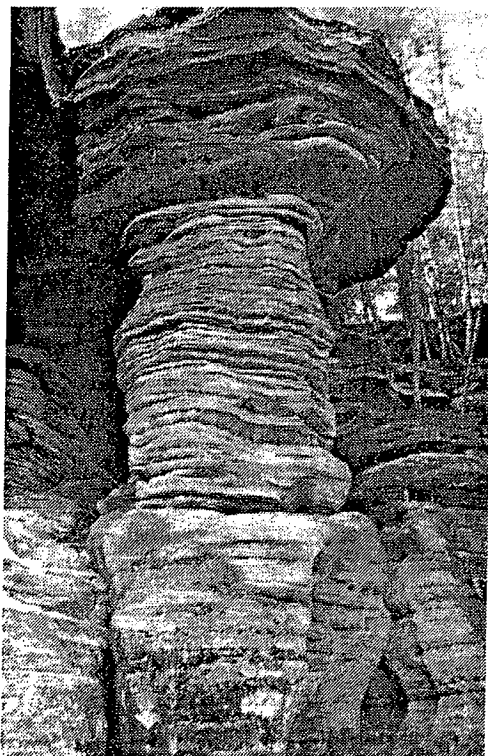
Land use in the region is heavily agricultural outside developed cities and villages. Residential and second home development is increasing due to population increases and the popularity of the area for recreational pursuits. These land use pressures are continuing the trend towards a decrease in agricultural lands according to area county zoning departments.

Zoning along the river corridor within the city limits of Wisconsin Dells stipulates a three-hundred foot setback for any development. County shoreland zoning applies in other areas which regulate development within three-hundred feet of the floodplain or ordinary high water mark. Most permanent structures are required to be set back at least seventy-five feet from the river.

## V. RESOURCE INVENTORIES

### A. Soils, Geology, Hydrology

The Dells of the Wisconsin River State Natural Area is located at the southern margin of the Central Sands Plain of Wisconsin. This plain is underlain by sand deposited in what was once a large glacial lake. The Dells are characterized by nearly vertical rock cliffs along the river, which are flanked by flat to gently rolling backlands. (The word "dells" is a variation of the word "dalles", of French origin, meaning the steep precipices forming the sides of a gorge.) Cliffs along the river rise over one-hundred feet above the water in places, and have been shaped by the erosive processes of water and wind. Several steep-sided tributary canyons cut through the rocks on the east side of the main gorge.



Toadstool Rock Photo by T.A. Meyer

These spectacular rock formations and canyons were given fanciful names by early promoters of the tourist trade (see map on back cover). Though many are scarred by vandals who over the decades carved their initials in the soft sandstone, Stand Rock, Coldwater Canyon, Visor Ledge, Chimney Rock, Romance Cliff, and several other formations continue to inspire visitors with their geological beauty.

The sandstones exposed in the cliffs of the Dells, as well as the nearby bluffs, were formed about 510-520 million years ago during the Cambrian Period. The sandstones in the cliffs were deposited as windblown dune sands, which are characterized by prominently inclined layering observable in many places. During the deposition of the dunes, the shore of an inland sea lay to the west, between the Dells and the Mississippi River. The sea gradually encroached eastward to flood the Dells area, and as this happened, the region was temporarily part of the sandy shore of a sea in which the sandstone just above the gorge was deposited. Then, as the shoreline moved far to the north, sandstones containing some fossils were deposited. These are exposed in nearby hills, such as Elephant's Back and Louis' Bluff.

About 510 million years ago at the beginning of the Ordovician Period, conditions changed in the existing inland sea so that the deposition of sand gave way to the accumulation of limestone and dolomite, which now cap the highest hills west of the Dells, such as Rattlesnake Knob and Coon Bluff.

There is a long gap in the known geological history of the Dells area following deposition of the Early Ordovician dolomite. No deposits are known for the interval between 500 million years ago and the last glaciation of Wisconsin, which began about 20,000 years ago during late Pleistocene epoch. The great continental glacier, called the Laurentide Ice Sheet, flowed

southward through the Green Bay lowland, over the east end of the Baraboo Hills, and to within three miles of the Upper Dells. Approximately 15,000 years ago, the ice front dammed the Wisconsin River at a point one mile east of present Lake Delton to form Glacial Lake Wisconsin, which was about as large as Utah's Great Salt Lake and as deep as 150 feet. This huge lake submerged the Dells area and stretched north across the Central Sands Plain nearly to Wisconsin Rapids. As the glacier began melting about 14,000 years ago, the ice dam failed and the lake drained rapidly southward. Flow from the lake was constricted by sandstone ridges to the west and a low ridge of glacial deposits (a moraine) southeast of the Dells. As the huge volume of water gushed southward through a gap less than a mile wide, it carved the network of narrow, steep-sided canyons visible today at the Dells. Scientists estimate that within a few days, Glacial Lake Wisconsin's water level dropped as much as one-hundred feet. The great flood carved not only the main Wisconsin River gorge at the Dells, but also tributary canyons (Witches Gulch, Artist's Glen, Roodes Glen, and Coldwater Canyon) on the east side and the canyons cutting west of Blackhawk Island and through Rocky Arbor State Park on the west side of the Dells. It also stripped away the glacial lake deposits from the uplands surrounding these canyons.

The Cambrian sandstone of the Dells area is overlain by a layer less than one meter thick of sand and silt deposited mostly since glacial times, that is during the past 10,000-15,000 years. East of the Dells, some sand was deposited by meltwater streams flowing from the retreating glacier. East and west of the Dells, there are also windblown sands and silts upon which loamy soil has developed. Both of these young deposits and the underlying Cambrian sandstone are very permeable and easily eroded.

Soils in the area can be generally characterized as excessively drained and sandy with some areas of silty and loamy soils. The river gorge is primarily sandstone rock outcrops with adjacent soils composed of sandy or loamy material underlain by glacial outwash sands.

The Wisconsin River in both the Upper and Lower Dells is characterized by a sandy bottom with areas of rock ledges. Flow in the river is highly variable and is heavily influenced by operation of the Castle Rock dam located approximately fourteen miles upriver from the Upper Dells, and the Kilbourn Dam within the City of Wisconsin Dells. The Kilbourn dam separates the Upper Dells from the Lower Dells. The dam was completed in 1909 to improve navigation and to create hydroelectric power. It is currently owned by Wisconsin Power and Light Company. Both dams are operated on a peaking basis to generate electric power in the region.

The river is known for its strong swirling currents, which at times of higher water levels can make navigation difficult for boats particularly in the narrow areas and below the dams. Sandbars along the river corridor are the result of deposition of sands by the river current and they are known to change shape and size periodically due to action by the river. During periods of high water, the sandbars can be completely submerged. The maximum depth of the river in the Upper Dells is approximately one-hundred feet at The Narrows. A point in The Narrows known as Black Hawk's Leap is the narrowest part of the river at fifty-two feet in width. Further upstream near Stand Rock and north of Witches Gulch, the river widens and is shallow and flowage-like for a distance of approximately four miles.



The Dells is located in the Lower Wisconsin River Basin which drains approximately 4,940 square miles of south-central and southwestern Wisconsin. The natural area is contained within the Dell Creek watershed on the west side of the river and the Duck Creek watershed on the east side. Agriculture is the predominant land use in the watersheds with the exception of the area in the City of Wisconsin Dells and the Village of Lake Delton. The Dell Creek Watershed has been named a DNR Priority Watershed and is currently being evaluated to assess the impacts of land use on water quality and to determine methods to lessen these impacts. Water quality in this portion of the Wisconsin River is generally good.

## **B. Forest Cover - An Overview of Historical and Current Composition**

In 1995, a comprehensive forest reconnaissance was conducted for the Dells of the Wisconsin River State Natural Area to provide data for preparation of the master plan. Department foresters delineated and mapped forest types and prepared forest management recommendations for each stand.

State Natural Areas are normally not managed to maximize timber resources. The forest resources data presented here provide supporting background information essential to understanding the recommended strategy for managing the vegetation at the Dells.

For many decades previous owners have maintained natural woodlands and pine plantations along the Wisconsin River in the Dells corridor. Their primary objective was to preserve the aesthetic qualities of the riverway and protect the corridor from visual intrusion by homes and other developments. The result of their stewardship is the dense forest we see today, composed primarily of large oaks, white pines and red pines.

Nearly 90 percent of the land within the existing property boundary is forested. Oaks comprise about 49 percent of the timber in the natural area. White pine accounts for about 31 percent, red pine about 9 percent and jack pine about 8 percent. The size class distribution of primary timber types (oaks and pines) indicates 82 percent of the trees are sawtimber size, while about 18 percent are pole timber, and a fraction of 1 percent are saplings.

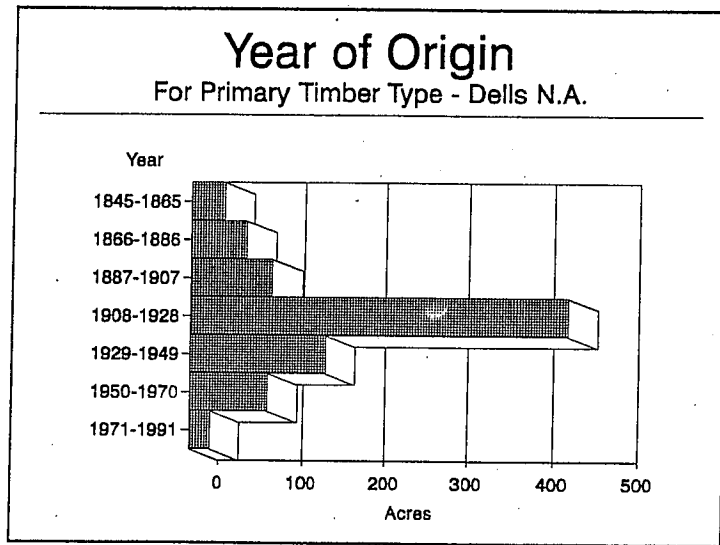
The existing forest is not, however, identical to pre-settlement conditions. The forest is in a state of continual change and a century from now will likely be somewhat different than it appears today.

Prior to settlement, the Dells area was vegetated by plant communities influenced by frequent fires. As a result, fire-sensitive species such as maples were found only in the most fire-protected sites. Early successional woodlands with oaks and pines grading into open savannas and grasslands grew well on the dry, sandy soils of the Dells region. Today, most of the forest in the natural area can be classified as a dry-mesic northern forest. Typical species composition include mixtures of pin oak, black oak, white oak, jack pine, white pine and red pine. Some of the sites with slightly more moisture have red oak and white oak mixed with red maples and black cherry.

Exceptions to the drier oak-pine forest are found on the property. For example, some of the protected glens and cliff faces along the river provide unique environments for cool,

moisture-demanding species such as hemlock and white cedar that would normally be found further north.

The remainder of the woodland in the natural area reflects changes occurring in the surrounding central-sands forests. The advent of fire control, and disturbances such as grazing, farming, and timber harvesting have dramatically altered the landscape. With the cessation of fires, oak and pine seedlings invaded the savanna and prairie openings. The oldest oaks on the property -- those originating in the mid to late 1800's -- tend to be savanna-grown trees that once had large spreading crowns (see Graph 1). Portions of the Dells property were used for pasture, which influenced the quality of trees and ground flora. Some of the land had been used as cropland and has since been planted to pine trees. Selective timber harvests were conducted during the last thirty years in the woodlands away from the river's edge.



Graph 1.

In the absence of fire, natural white pines have increased and are better represented now than they were in pre-settlement time. White pines are found mixed with oaks and are an important species in either the primary, secondary or understory cover types on 55 percent of the natural area property. Dry sandy soils are likely to regenerate naturally to white pines, pin oaks, black oaks and white oaks in the future. With time, however, will come other changes that may influence the stability of the pine-oak forest composition.

One change has been the increase in the deer population. Both white pine and oak seedlings are favorite browse for deer. The burgeoning deer herd's effects can be seen in the absence or severe reduction in tree seedlings in many areas. While the overstory and intermediate size class trees appear vigorous, some areas lack healthy tree reproduction. Unless deer numbers are controlled, the future effect of heavy browse will change forest configuration.

Time and the absence of fire is also resulting in the increase of red maples and other shade-tolerant species such as black cherry and hickories. In some areas, especially those with more moisture such as north and east slopes and valleys, red maples will out-compete white pines and oaks. The result will be a gradual reduction in the number of white pines and oaks. This trend is already evident in some stands on the east side of the Wisconsin River which have an overstory of century-old white pines and black oaks. The dense shade of the understory is ideal for the development of red maples, but less so for pine or oak seedlings. White pines are long-lived (commonly growing for two-hundred years and sometimes up to four-hundred years), but a policy of allowing natural processes to progress will likely result

in a reduction of white pine levels and a succession to red maples over time on moister sites.

Other naturally-occurring pine species, red (Norway) pines and jack pines, will also become less common even on dry sites. Red pines typically live between one-hundred and two-hundred years while jack pines live between fifty and ninety years. Both species are dependent upon fire related disturbance (or harvests combined with planting or seeding) for renewal. Sites now occupied by red pines or jack pines will give way to oaks, white pines and red maples with time.

Approximately ninety-one acres (10 percent of the forested area of the property) are pine plantations. The largest block, about sixty acres located south of Witches Gulch, is known as the Crandall Pines, named for local resident George Crandall who initiated its planting. The plantation dates back to 1926 and is comprised of red and white pines originating from seedlings obtained from the former Wisconsin Conservation Department's Trout Lake Nursery. The original purpose of the plantation was to expand the adjacent forest to improve the view from the Wisconsin River. Many regard the plantation as a monument to the Crandalls and their desire to preserve the scenic nature of the Dells. Other small pine plantations were established throughout the natural area by the Crandalls and their successors between 1940 and 1970.

Although some commercial thinning was accomplished in the 1970's and early 1990's, the plantations are generally overstocked and the trees are in need of more room for air, water, and nutrients. Forest pests have caused mortality in some pockets of trees.



Crandall Pines

Photo by T.A. Meyer

### C. Endangered Resources

In 1995, biologists from the Department's Bureau of Endangered Resources (BER) conducted surveys to identify and document occurrences of endangered resources in the Dells of the Wisconsin River State Natural Area. Endangered resources include plants and animals on the BER's Natural Heritage Inventory Working List of rare species. They also include high quality examples of natural communities. Natural communities are groupings of organisms which live together in the same general place and have mutual interactions. Examples include dry prairies and floodplain forests.

A multidisciplinary team of specialists completed assessments for birds, herptiles (reptiles and amphibians), aquatic insects, natural communities, and vascular plants. A specialist from the Milwaukee Public Museum was contracted to search for non-vascular plants (mosses and liverworts). Due to time and financial constraints, an exhaustive survey for all species

groups over the entire Dells property was not possible. The team focused its efforts on areas within the current property boundary having the greatest potential for harboring rare species and natural communities. It looked less intensively at areas with a history of past disturbance and at sites for future acquisition.

If resources become available for more thorough investigations of the plant and animal groups at the Dells, it is recommended that surveys be conducted for rare vascular plants in non-cliff habitats, macro-fungi, and, especially, lichens. The extensive cliffs in the Dells provide a variety of habitats for lichens and may harbor several rare species.

Original data and site inspection reports generated by the 1995 surveys are filed with the Natural Heritage Inventory.

Note: *Endangered Species* = Any species whose continued existence as a viable component of Wisconsin's wild animals or wild plants is determined by the Department to be in jeopardy on the basis of scientific evidence.

*Threatened Species* = Any species which appears likely, within the foreseeable future, on the basis of scientific evidence to become endangered in Wisconsin.

*Special Concern Species* = Any species which is suspected, but not yet proven, to be rare in Wisconsin.

## 1. Significant Natural Communities

The natural community classification used by the BER's Natural Heritage Inventory is based on that developed by pioneering plant ecologist John Curtis as described in his 1959 book *Vegetation of Wisconsin*. The Dells of the Wisconsin River State Natural Area harbors several natural communities--some are of high quality, and are of state-wide significance, others are more disturbed and are of lesser importance. The more disturbed areas and those lands outside the current ownership were not thoroughly inspected in the 1995 survey.

Following are synopses of the most significant, high-quality natural communities present in the Dells. Natural communities determined to be of lesser significance because of poor quality or small areal extent (such as dry prairie) are not included. Refer to the Vegetation Cover map (Figure 2) for locations of natural communities.

### a. Northern Mesic Forest

Typically found in northern Wisconsin, this relict community occurs in the Dells associated with moist Cambrian sandstone cliffs, usually with an eastern or northern exposure. Eastern hemlock is the dominant tree, growing with lesser amounts of white pine, yellow birch, sugar maple, red pine, red oak, paper birch, and white ash. Characteristic plants of the forest floor include Canada mayflower (*Maianthemum canadense*), rosy twisted-stalk (*Streptopus roseus*), bluebead lily (*Clintonia borealis*), and goldthread (*Coptis groenlandica*). Excellent examples of this type occur at Artist Glen, Coldwater Canyon, Witches Gulch, and scattered along east-facing cliffs in the Wisconsin River gorge from the Cambrian Overlook downstream to The Narrows.

## b. Northern Dry-mesic Forest

The dry-mesic forests in the natural area are composed primarily of red and white pines, and red oak in association with white oak, red maple, bigtooth aspen, and black cherry. The shrub and ground layers are typical of the pine forests of the north, containing huckleberry (*Gaylussacia baccata*), blueberries (*Vaccinium* spp.), wintergreen (*Gaultheria procumbens*), and pink lady's-slipper (*Cypripedium acaule*). Herbs of more southerly distribution are also present, including tick-trefoils (*Desmodium* spp.), and lopseed (*Phryma leptostachya*). As its name implies, this community type is found on drier sites. The best quality stands of northern dry-mesic forest border the east side of the Wisconsin River from Coldwater Canyon south to Crandall's Bay and in the Lower Dells north of the wastewater treatment plant.



Northern Dry-mesic Forest at Coldwater Canyon  
Photo by T.A. Meyer

## c. Southern Dry-mesic Forest

Dominant trees in this hardwood forest community are white and red oaks. Canopy associates include bur oak, basswood, red maple, black cherry, bigtooth aspen, and bitternut hickory. Understory species are those found primarily in southern oak forests, and include tick-trefoils, lopseed, interrupted fern (*Osmunda clayoniana*), arrow-leaved aster (*Aster sagittifolius*), and wild sarsaparilla (*Aralia nudicaulis*). The forest south of Stand Rock is the best quality example of this type in the natural area.

## d. Mixed Dry Forest

This community type is composed of a mosaic of northern and southern tree species on drouthy, infertile sites. Oaks, primarily black, bur, and Hill's oaks, jack pine and lesser amounts of white and red pine comprise the mixed dry forest. Overgrown oak savanna, or oak barrens, is included in this type. High quality examples of this feature are not present within the current ownership of the natural area, but restorable oak savanna/barrens, with remnant prairie/savanna understory species, exist in a few areas in the project boundary.

#### e. Shaded (Moist) Cliff

The shaded cliff community is commonly found on northern and eastern exposures of Cambrian sandstone, especially in the steep-sided gorges. This type also flanks the Wisconsin River. It is characterized by shady, cool, and moist conditions. Vascular plants typical of cool, northern forests, along with mosses and lichens, are common. Several rare plant species (described below) inhabit the shaded and open cliffs at the Dells. Excellent examples of this type are found in Artist Glen, Coldwater Canyon, and Witches Gulch.

#### f. Open (Dry) Cliff.

Dry cliffs are extensive in the natural area, found generally on western and southern exposures (see front cover). The warm, dry, sunny conditions provide habitat for a number of species with dry forest and dry prairie affinities. Characteristic species include common polypody (*Polypodium vulgare*), harebell (*Campanula rotundiolia*), rock cress (*Arabis lyrata*), and rusty woodsia (*Woodsia ilvensis*). A handful of plants not usually associated with cliffs are also found on the rock faces, including Labrador tea (*Ledum groenlandicum*), typically found in bogs, and shrubby cinquefoil (*Potentilla fruticosa*), a species usually found in wet, calcareous fens. Impressive examples of dry cliffs are found flanking the Wisconsin River on the east bank from Witches Gulch downstream to the Lower Dells.

### 2. Rare Vascular Plants

Except, perhaps, for the geological formations that comprise "the Dells", no feature has intrigued the scientific community more than the unique assemblage of vascular plants found here. The flora of the natural area is very diverse owing to the wide variety of natural community types, topography, soils, and microhabitats within its borders. With sites ranging from cool, moist, shaded glens to hot, dry, sunny slopes, the property offers habitat for plant species with northern as well as southern affinities. Plants normally found in northern forests grow in close proximity to those more typical of southern Wisconsin dry prairies.

Most noteworthy are the guild of unusual plant species growing on the Cambrian sandstone cliffs in the Wisconsin River gorge and the glens and canyons tributary to it. With a variety of exposures and moisture regimes, the cliffs afford many different niches for plants, some of which are very rare in Wisconsin.

The presence of some of these rare species has been known to botanists, professional and amateur alike, since before the turn of the century. The purpose of the 1995 vascular plant survey was to relocate historical populations of rare species and search for species previously unknown in the Dells. Although compiling a comprehensive list of vascular plants for the natural area was not among the survey objectives, a preliminary plant list numbering more than 240 species was assembled and is included in the Appendix.

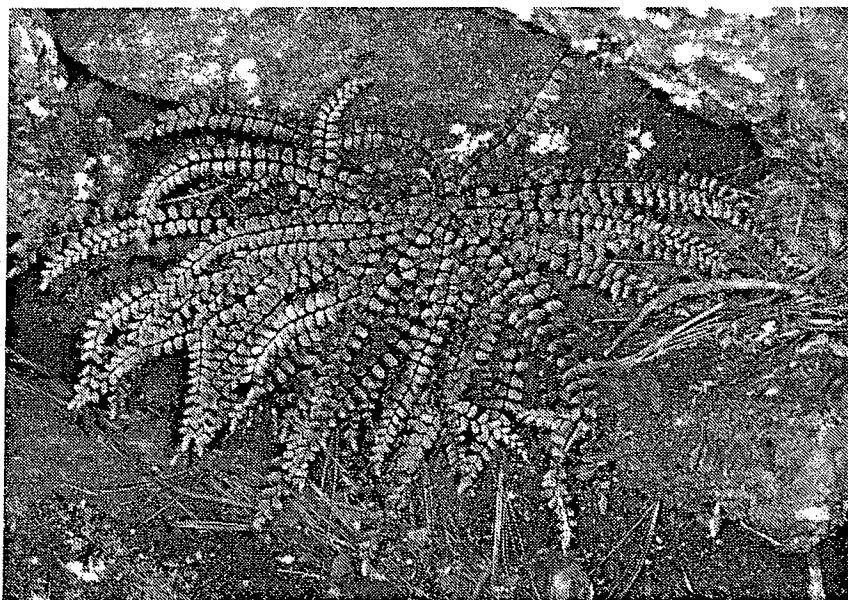
One of the primary reasons for initially designating the property a State Natural Area was to recognize and protect rare plants. Accordingly, a thorough discussion of this resource is presented here.

**Round-stemmed false foxglove (*Agalinis gattereri*)** Threatened Species

This species, not previously recorded from the Dells, was discovered at several sites scattered along the mainstem of the Wisconsin River in the Upper Dells. It was found primarily on the east side of the river on sandy cliff ledges in full sun. The difficulty in identifying this species in the field (specimens were collected and identified later) and its close resemblance to the common rough false foxglove (*A. aspera*) which grows along with *A. gattereri* at the Dells, precluded the collection of specific location and quantitative data. Despite this lack of data, the Dells population of round-stemmed false foxglove probably represents the largest, most-contiguous population in the state.

**Maidenhair spleenwort (*Asplenium trichomanes*)** Special Concern Species

This small, delicate fern was first recorded from the Dells in 1867. It prefers cool, shaded cliffs, growing in crevices and soil pockets in association with other ferns (*Gymnocarpium*, *Polypodium*), lichens, and bryophytes (mosses and liverworts). The fern is nearly always found in close proximity to water, perhaps due to a requirement for higher humidity. *Asplenium trichomanes* is nearly ubiquitous throughout the Upper Dells river corridor due to an abundance of shaded cliff habitat. The largest and densest subpopulations are found on the west side of the river with smaller subpopulations found on the east side. The Lower Dells also harbors a few populations. Although specific locations were documented for this species, no effort was made to quantify the population because of the great number of individuals. It certainly numbers several thousand plants. In comparison to other known maidenhair spleenwort sites in the state, the Dells embraces the largest, densest population known in Wisconsin.



Maidenhair spleenwort Photo by T.A. Meyer

**Fragrant fern (*Dryopteris fragrans*)**

Special Concern Species

Literature and herbarium accounts indicate that this uncommon plant was once fairly widespread in the Dells where it was collected extensively around the turn of the century for the sweet smell of its fronds. However, intensive searches along the Wisconsin River in 1995 found only two small populations, both in the Upper Dells, one on a sunny cliff, the other on a shady cliff. This is clearly a species that has been reduced in number by indiscriminate collecting and as such is a good candidate for population enhancement.



**Ginseng** (*Panax quinquefolius*)

Special Concern Species

Ginseng is an understory species characteristic of rich woodlands. The root is sought for its herbal qualities and populations of wild ginseng have been reduced statewide by over-collecting. About ten plants were found in southern dry-mesic forest habitat in the Upper Dells.

**Arctic primrose** (*Primula mistassinica*)

Special Concern Species

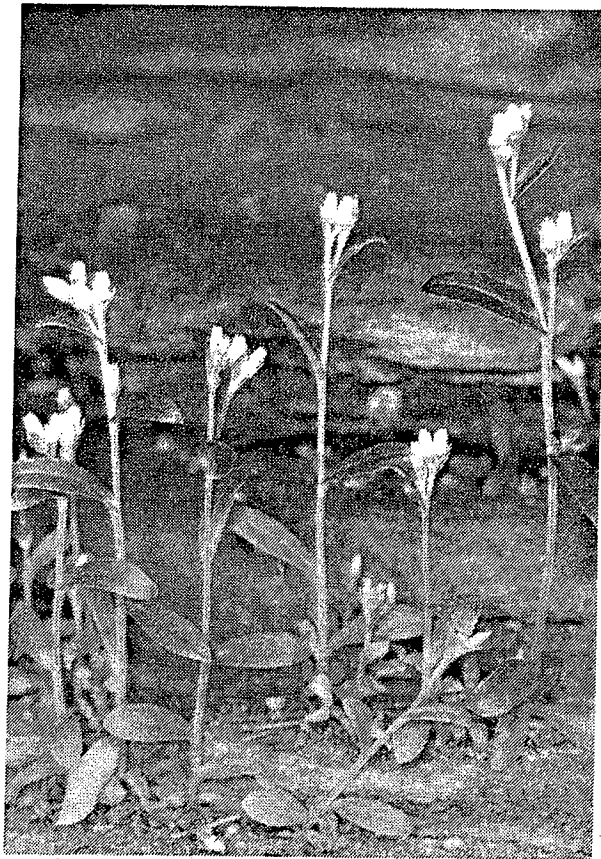
Arctic, or bird's-eye, primrose is a boreal species first collected from the Dells in 1886. It is restricted to moist, shaded, sandstone cliffs and ledges and is almost always found in close proximity to the river. It is recognized by its basal rosette of small, spatulate leaves and small pink flowers atop leafless stems. This species often grows in dense clones, owing to its ability to spread by an extensive system of stolons. Bird's-eye primrose blooms in early spring and was past its flowering period when rare plant surveys were conducted in 1995. Although a few populations were noted in the course of 1995 field work, a complete survey for this species was not possible. The statewide significance of the Dells primrose population is unknown.

**Cliff cudweed** (*Gnaphalium saxicola*)

Proposed Threatened Species

Cliff cudweed is, perhaps, the most intriguing plant species found in the Dells, and is certainly one of Wisconsin's rarest. Once believed to be merely a variety of a more common plant (*Gnaphalium obtusifolium*), research has determined it to be a distinct species.

Most notably, it is endemic to southwestern Wisconsin; it is found nowhere else in the world but in the Dells and in the valley of the Kickapoo River. Seven subpopulations were located in the Upper Dells corridor as a result of very extensive searches in 1995. Three subpopulations occur in the Dells natural area, while the remainder are found on University of Wisconsin Extension land at Blackhawk Island. The three subpopulations in the natural area numbered between 400-600 plants in 1995, but population size may vary considerably from year to year given the annual growth habit of this species. It is believed the Dells population is the largest, most viable anywhere on the planet. All populations were found on exposed to slightly shaded sandstone ledges in thin, sandy, somewhat mesic soil.



Cliff Cudweed Photo by T.A. Meyer



**Lapland rosebay (*Rhododendron lapponicum*)****Endangered Species**

Lapland rosebay, also called Lapland azalea, is Wisconsin's only native rhododendron, known from just two small populations in the southwestern corner of the state. It is a small shrub characterized by waxy, evergreen leaves and pink, azalea-like flowers that is normally found far to our north in arctic/alpine regions. The rosebay's presence in our state is enigmatic, but the species is probably a relict of a former colder, post-glacial climate. As the climate warmed, Lapland rosebay was able to survive in cool river gorges such as that in the Dells of the Wisconsin River. One small population is known to exist on a single cliff in the Dells, where it was first recorded in 1898. The population consists of a narrow, five-meter long, horizontal band of intertwined plants perched on the lip of sandstone cliff overhanging the river. A single, isolated plant is located about thirty-five meters downstream of the main population. Although apparently secure for the time being, a single catastrophic event could eliminate the majority of the population.

**Cliff goldenrod (*Solidago sciaphila*)****Special Concern Species**

As its name implies, cliff goldenrod prefers dry, open cliffs and other rocky/sandy areas. In the Dells, it grows with other dry prairie species and cliff-dwellers such as harebell (*Campanula rotundifolia*) and rock cress (*Arabis lyrata*). It also associates with hairy goldenrod (*Solidago hispida*). These two goldenrods are very similar in appearance and are difficult to differentiate from one another at a distance in the field. They also apparently hybridize with one another. Cliff goldenrod is found at many locations in the Upper and Lower Dells, and is locally common there. No effort was made to document exact locations or sizes of the subpopulations, however, the Dells is an important site for this species owing to the large amount of protected, contiguous habitat.

**Sullivantia (*Sullivantia sullivantia*)****Special Concern Species**

Sullivantia is a diminutive member of the saxifrage family recorded from the Dells first in 1858 (collected by Increase A. Lapham). The plant grows in crevices of cool, moist, shaded cliffs, although it can tolerate some sun. Six subpopulations of sullivantia were located in the natural area, all in the main Wisconsin River gorge--five in the Upper Dells and one in the Lower Dells. One large subpopulation consisting of several hundred plants and one small subpopulation containing a single individual were found on the cliffs on the east side of the river. Three subpopulations of twenty-five to one-hundred plants were located on the west side of the river between Blackhawk Island and the Cambrian Overlook. The subpopulation in the Lower Dells numbered about one-hundred plants. Several other subpopulations were found on University of Wisconsin Extension property bordering the river in the Devil's Elbow area on Blackhawk Island, but these were not quantified. Taken as a whole, the sullivantia population is significant at the local to regional level. Additional searches of some of the side canyons and the cliffs on the west side of the river in the Lower Dells may reveal more populations of this species.

### **3. Rare Nonvascular Plants**

A preliminary inventory of the bryophytes (mosses and liverworts) was conducted to determine general bryophyte distribution in the Upper Dells. A total of forty-two bryophyte taxa--thirty-two mosses and ten liverworts--were identified. See the Appendix for a species list of bryophytes. Although the statewide list of rare bryophytes is still being finalized, several of the species collected at the Dells will undoubtedly be on that list. In addition,

several county records and three mosses never before reported for Wisconsin were discovered. These mosses are *Philonotis fontana* var. *caespitosa*, *Polytrichum pallidiseta*, and *Pseudotaxiphyllum distichaceum*.

#### 4. Rare Herptiles

Herptile surveys in the natural area were considered a lower priority than surveys for most other taxa due to a lack of extensive reptile and amphibian habitat. Riverine conditions in the upper Dells (deep water with little riparian access and little submerged vegetation), and the shady conditions of the adjacent uplands are not favorable to herps. Of the thirty-four herptile species that could potentially occur on the Dells property, six are considered rare. They include four-toed salamander (*Hemidactylium scutatum*), pickerel frog (*Rana palustris*), Blanding's turtle (*Emydoidea blandingii*), smooth softshell turtle (*Apalone muticus*), wood turtle (*Clemmys insculpta*), and western slender glass lizard (*Ophisaurus attenuatus attenuatus*).

Limited searches for these and other herp species revealed no endangered, threatened, or special concern species. The following reptiles and amphibians were found during the survey: green frog (*Rana clamitans*), American toad (*Bufo americanus americanus*), spiny softshell turtle (*Apalone spiniferus spiniferus*), false map turtle (*Graptemys pseudogeographica*), and painted turtle (*Chrysemys picta*).

#### 5. Rare Birds

Spring breeding bird surveys were undertaken in several natural communities in the Dells natural area. Generally, birds typically associated with a given community type were present as expected. Also found in several of the northern forest relicts was the Louisiana waterthrush, a species of Special Concern of southern distribution in Wisconsin which often breeds along small high-gradient streams within forested gorges. See the Appendix for a preliminary species list.

A nesting pair of bald eagles is currently using the Lower Dells for a territory, though the nest tree is currently outside of the natural area boundary. The Kilbourn Dam area has attracted good numbers of wintering bald eagles during certain winters. These birds feed on fish that have been stunned as they pass through the dam.

#### 6. Rare Aquatic Insects

A limited search for rare aquatic insects was conducted with efforts concentrated in Gulch Creek and the Wisconsin River. Species typical of clear, cold streams were found in Gulch Creek, while the Wisconsin River yielded species normally found in large, warm, turbid river systems. Six species of rare odanates (dragonflies and damselflies) were found as a result of the survey.

*Macromia taeniolata* (Royal river cruiser) Special Concern Species

The population of this dragonfly was newly discovered in 1995 and is only one of two known from the Wisconsin River.

*Neurocordulia molesta* (Smoky shadowfly) Special Concern Species  
This species is found here at the upper extent of its Wisconsin River distribution.

*Neurocordulia yamaskanensis* (Stygian shadowfly) Special Concern Species  
The population of this dragonfly at the Dells is one of the largest known in Wisconsin.

*Stylurus amnicola* (Riverine clubtail) Special Concern Species  
This species inhabits a wide range of riverine habitats. The population at the Dells is not significant from a statewide perspective.

*Stylurus notatus* (Elusive clubtail) Special Concern Species  
This species is found here at the upper extent of its Wisconsin River distribution.

*Stylurus plagiatus* (Russet-tipped clubtail) Special Concern Species  
This dragonfly is at the upper extent of its Wisconsin River distribution at the Dells. Few other populations are known from the state.

## 7. Rare Mussels

Systematic surveys were conducted in recent years in the Wisconsin River from the Prairie du Sac Dam upstream to the Kilbourn Dam to determine the distribution and relative abundance of freshwater mussels. Several species of rare mussels were found in the 46.5 mile stretch of river between the two dams which includes a portion of the natural area in the Lower Dells. Although some of these rare mussels may not now inhabit the segment of the river bordered by the natural area, the potential exists for them to be found if appropriate habitat is present. Rare mussels known to occur between the dams include the following:

<i>Anodonta imbecillis</i>	(Paper pondshell)	Special Concern Species
<i>Lasmigona compressa</i>	(Creek heelsplitter)	Special Concern Species
<i>Plethobasus cyphus</i>	(Bullhead)	Endangered Species
<i>Pleurobema sintoxia</i>	(Round pigtoe)	Special Concern Species
<i>Simpsonaias ambigua</i>	(Salamander mussel)	Threatened Species
<i>Tritogonia verrucosa</i>	(Buckhorn)	Threatened Species

Seventeen other mussel taxa were also recorded for the area. Mussel data for the Wisconsin River above the Kilbourn Dam were not available.

## D. Wildlife Resources

The natural area is characterized as a forested upland community type. Wildlife species common to Central Wisconsin forest types, such as white-tailed deer, ruffed grouse, wild turkey, woodcock, gray and fox squirrels, raccoon, cottontail rabbit, red-tailed hawk, and great horned and barred owls are presumed to be present on the property. In addition, reptiles and amphibians commonly found in similar habitats in Central Wisconsin are also assumed to be present. Age of the timber on the area indicates that the present habitat types have existed on the property for over one half century or more. Wildlife species now present on the site have probably been found on the site for a similar period of time.

The property may have had many more acres of grasslands prior to the conifer plantations begun in the 1920's. Provided the area was in a grass cover type rather than agriculture prior to planting, it is assumed that more songbird species common to grassland habitats would have been found on the property at one time. However, this may have been offset by a greater portion of the area being intensively farmed during the early and mid part of the century.

### **1. Game Species**

The abundance of forested habitat on and around the property, and its association with agriculture, has made the general area ideal range for the white-tailed deer. Current deer populations are well over winter goals of twenty-five deer per square mile of range in the Upper Dells, and thirty-five deer per square mile in the Lower Dells. Based on recent harvest information, deer populations in the area are probably the highest they have ever been. This has led to complaints of damage to crops and to ornamental plants, and loss of floristic diversity in the natural area.

Forest wildlife species such as ruffed grouse, woodcock and squirrels are present in good numbers. They have been in the area since the present forest cover type first dominated the landscape. Wild turkeys are numerous on the property and their population levels are probably similar to the mid 1800's when the area was settled. Turkeys were extirpated in Wisconsin and were reintroduced in 1976.

Gray and fox squirrels and upland furbearer species such as raccoon are abundant in the area. The wealth of mast-producing trees, agricultural crops, and den or cavity trees could account for this.

### **2. Non-Game Species**

Non-game populations on the natural area will be determined by the maturation of the forest habitat on the property and surrounding land use practices. Pileated woodpeckers and ovenbirds are known to benefit from the type of mature timber habitat that is present in the natural area. Birds found in the northern mesic forest type included southern Wisconsin species as well as species more commonly found in northern Wisconsin. Examples of this group are blackburnian, black-throated green, and pine warblers, red-breasted nuthatch, and solitary vireo.

### **E. Fisheries**

The Wisconsin River in the Lower Dells below the Kilbourn Dam contains a very diverse warm-water fishery, particularly for walleye, sauger, smallmouth bass, lake sturgeon, white bass, and channel catfish. Northern pike and other panfish species are present to a lesser extent. Populations of rough fish such as quillback, carp and northern redhorse suckers are common. Fish populations in this area of the river are known to fluctuate seasonally which is common in river systems. The area below the dam is an important spawning area for walleye that migrate upriver from Lake Wisconsin. Walleye reproduction fluctuates below the dam with a very strong year class in 1994. Lake sturgeon also spawn in this area.

The river below the dam is a very popular area for fishing, primarily by boat. The spring spawning run for walleye creates very heavy fishing pressure in the months of March and April. A creel census in spring 1994 estimated that 67,000 person hours of fishing pressure occurred in the Lower Dells during this time. Fishing for smallmouth bass is also popular, particularly during the summer months. Seasonal runs of white bass attract many anglers in late May into June. The fall sturgeon season is also popular in the Lower Dells although it does not receive the extreme pressure that occurs during the spring walleye run. Much of the sturgeon fishing occurs at night.

The Wisconsin River in the Upper Dells above the Kilbourn Dam contains a fishery similar to that in the Lower Dells, with the exception that sauger and white bass are not present above the dam and very few lake sturgeon are present. Lake sturgeon are not able to move upstream through the dam, but are known to move downstream through dams on the river. Walleye populations are abundant, with good natural reproduction occurring upstream near the Castle Rock Dam. Smallmouth bass and channel catfish are also present in good numbers. The fishing pressure in the Upper Dells is spread evenly throughout the season as much of the spring fishing for walleye occurs below the Castle Rock Dam. Summer fishing in the Upper Dells can be difficult due to the heavy boating traffic on the river in the warmer months.

Two streams tributary to the river above the dam contain small populations of brook trout. Gulch Creek is a 3.5 mile long spring-fed stream with very good water quality. The mouth and lower portion of the creek are within the existing natural area ownership, while an adjacent upstream 1.5 miles of the creek are within the project boundary. Gilmore Creek is 3.5 miles long and is also classified as a trout stream. This creek has been degraded from erosion and siltation. The creek flows into the west side of the Wisconsin River just south of Louis' Bluff and has an established project boundary as a DNR fishery area. The fishery area boundary adjoins the natural area boundary. Although there is an established project boundary the Department does not own any land within the Gilmore Creek corridor.

Boating access for fishing in the Lower Dells is primarily by fee through private landings two miles below the dam. The nearest public access is approximately four miles downriver at township landings on both sides of the river.

Boating access to the Upper Dells is at a city landing in Wisconsin Dells and at two private landings north of Witches Gulch approximately five to six miles upriver from the dam. One landing is located on the west side of the river in Juneau County and the other is on the east side of the river in Adams County.

## V. MANAGEMENT AND DEVELOPMENT PLANS

### A. Project Boundary, Land Acquisition and Ownership Goals

The project boundary for the Dells of the Wisconsin River State Natural Area encompasses approximately 2,115 acres of land. Currently, 1,050 acres along approximately five miles of the Wisconsin River corridor are in state ownership. The current state ownership is the result of a purchase from the Wisconsin Alumni Research Foundation made in 1994 consisting of 1,050 acres of land, and of two small purchases since that time from private landowners of less than one acre each in 1996. Acquisition costs to date have totaled \$2,934,500.00.

The remaining 1,065 acres within the project boundary are comprised of forty-six inholdings. Forty-five inholdings, or 1,035 acres, are privately owned. One inholding, of approximately twenty acres, is municipally owned and contiguous with the municipal wastewater treatment facility. Primary land uses within the boundary are permanent and seasonal residential, agricultural, forestry and recreational. Of the forty-six inholdings, twenty-eight are unimproved and eighteen have improvements.

The total estimated cost to acquire all lands and lower-value improvements within the boundary is \$1,980,500. This cost was determined by using the equalized value which was taken from the tax rolls. This estimate includes a cost of \$181,500 for those low-value improvements which are less than \$50,000 in value. The Department's policy is to avoid the acquisition of high-value improvements wherever possible, consequently \$669,500 in high-value improvements within the boundary are not included in acquisition costs. The estimated value of all land and improvements within the boundary is \$2,375,000. Acquisition costs could be further reduced through gifted lands and the use of easements, where appropriate. Conservation easements, streambank easements, and scenic easements may be appropriate for some situations. These alternatives to fee acquisition will be utilized for land control when possible. This may provide a significant reduction to acquisition costs. However, the savings cannot be accurately estimated at this point.

The Department's policy is to purchase from willing sellers only. This policy will be adhered to for land acquisition at the Dells of the Wisconsin River State Natural Area.

Trespasses, boundary disputes, and other land disputes which may arise will be resolved in conformance with existing Department policy. Requests for land sales, land trades, easements, land use agreements, and other agreements will be considered on a case by case basis. Specific parcels currently under consideration are the Fireman's Park picnic site, and the east shoreline of Crandall's Bay. The land use agreement with the Wisconsin Dells Fire Department for use of Fireman's Park will not be renewed. The Department will work with the parties involved to resolve any issues in a cooperative fashion while protecting the public interest. This philosophy will also apply to issues such as annexation of natural area land and utility crossings that involve adjacent municipalities. These situations will be evaluated based on potential impacts to natural area values and management.

The project boundary for the Dells of the Wisconsin River State Natural Area will provide a continuous, protected corridor along the river. It will also connect adjacent state lands-- Rocky Arbor and Camp Upham Woods-- to provide for a larger block of protected habitat for many species. The project acquisition goal encompasses additional unique habitat in tributary streams and canyons and provides a wider protective buffer for the river corridor where existing ownership is very narrow. Lands will be acquired in a manner that will give priority to these goals whenever possible.

The project boundary is not continuous on the west side of the river corridor in the Upper Dells between Camp Upham Woods and current Department ownership. An approximately ten acre parcel is not included in the boundary pending resolution of a land-use zoning issue. This parcel contains significant natural features that qualify it as an important addition to the natural area. The tract should be included in the acquisition boundary after resolution of the zoning issue.

## **B. Property Designation and Land Classification**

The property is designated as a State Natural Area with the exception of fifty-five acres that are leased to Dells Boat Tours for the purpose of commercial boat tours and concessions. These fifty-five acres are designated as State Park lands and located at Coldwater Canyon, Witches Gulch, and the Stand Rock Indian Ceremonial Grounds. Management of the leased areas is subject to the terms and conditions of the lease agreement with Dells Boat Tours. The leased areas will be classified as Recreation Management Type IV to reflect the use they will receive.

As this property is designated a natural area the primary management focus is to preserve and enhance natural resource values while providing opportunities for low-impact, less intensive recreational uses. Most of the property will be classified a Native Community Management Area. The management objective is to allow natural processes to proceed to the degree practical, and to restore and perpetuate native plant and animal communities. Management techniques such as brushing, cutting, herbicide treatments, and prescribed burning may be utilized to enhance or restore desired natural communities. Passive recreational uses such as hiking and nature study will be allowed within the Native Community Management Areas as long as these uses are compatible with the protection of these areas.

The lands immediately adjacent to and visible from the Wisconsin River will also be classified a Native Community Management Area. Preserving the aesthetic qualities of the river corridor will be a central component of the management and development activities on this portion of the property to ensure there are no negative impacts to the scenic values.

The Cambrian Overlook will be classified a Recreation Management Area Type III to reflect the more intensive visitor use and facility development this area is expected to receive. Refer to Section V.E.2.a. for a discussion of the development planned for this site.

## C. Natural Community and Vegetation Management

### 1. General Management Procedures

The vegetation of most State Natural Areas is managed using a "hands-off" approach--natural processes are allowed to proceed unimpeded, with little or no human intervention. For example, death of trees due to blowdown, fire, flooding, and disease is regarded as a normal, natural occurrence. Prevention of natural events such as these or amelioration of their effects is generally not done or is limited to that essential to ensure public safety.

The Department recognizes that the Dells of the Wisconsin River is unusual among State Natural Areas in that it not only harbors significant biological and geological features, but also protects a scenic river corridor important to the people of the State and vital to the local economy. As such, the Department will consider, on a case-by-case basis, deviation from the above standard in the event of unique or large-scale disturbances in order to maintain the aesthetic values of the scenic corridor. For example, wildfire will be extinguished in the scenic corridor as prescribed in the property's Wildfire Response Plan, to be developed jointly between the Department and local fire control officials. Likewise, control of plant diseases or insect infestations having a severe impact on the vegetation in the scenic corridor will be addressed by Department staff with expertise in natural area management and forestry.

Allowing nature to take its course is an effective approach to managing most natural areas. However, there are circumstances which require human intervention to maintain or restore the qualities for which a given natural area was established. These include controlling plant succession to sustain a particular natural community type, removal of exotic and invasive species, and restoration of disturbed land to a native plant community such as prairie.

The Dells of the Wisconsin River constitutes a somewhat narrow corridor isolated from other natural lands, and separated from them by a variety of different land uses such as agriculture, transportation rights-of-way, businesses, and residences. The extensive "edge" of this linear property, coupled with the historical lack of effective natural community stewardship, has resulted in a natural area in need of active management to restore its biological integrity.

Portions of the natural area suffer from unchecked natural invasion of exotic plant species from surrounding lands and from the intentional planting of species (such as spruce and fir trees) not typical of the Dells region. Several monotypic pine plantations are scattered throughout the property. Also, formerly open natural community types, such as pine/oak savanna have grown up to closed forest, resulting in a decrease in the ecological diversity of the area.

Natural community management in the Dells of the Wisconsin River will focus heavily on the elimination of invasive exotic plant species. These species will be controlled using methods described in the *Wisconsin Invasive Plant Control Manual*, drafted by Bureau of Endangered Resources staff. Species listed in the manual that occur in varying degrees in the Dells natural area include the following: exotic bush honeysuckles (*Lonicera tartarica*, *L. morrowii*, and *L. xbella*); multiflora rose (*Rosa multiflora*); Japanese barberry (*Berberis thunbergii*); spotted knapweed (*Centaurea maculosa*); Canada thistle (*Cirsium arvense*); garlic mustard (*Alliaria petiolata*); leafy spurge (*Euphorbia escula*); purple loosestrife (*Lythrum salicaria*); buckthorns



(*Rhamnus cathartica* and *R. frangula*); Siberian elm (*Ulmus pumila*); and black locust (*Robinia pseudoacacia*).

Preferred controls are cultural, employing appropriately timed pulling, digging, cutting, or girdling to eliminate the invasives. However, some species, such as black locust, are difficult to eliminate by cultural methods alone and short-duration herbicide applications may be used to suppress them. Regardless of the control method employed, ongoing monitoring of the results will be an integral part of the natural area management program.

In addition to removing targeted exotic species, prescribed fire will be used in remnant prairie and overgrown savanna areas to control invasive woody species and encourage understory plant growth. Prescribed burning mimics the fires that once occurred naturally in the prairie and savanna landscape. Removal of small, native tree species may also be done. The objective of these techniques is to restore a more open structure to areas which have closed due to the cessation of naturally occurring wildfire. Prescribed burns at the Old Indian Village site, Fireman's Park, the northeastern reaches of the Gulch Creek area, and near the municipal wastewater treatment facility in the Lower Dells will be conducted after a thorough campaign to educate the public of the ecological value of this necessary management technique. Burns, involving low intensity ground fires, will normally be done in early spring and would be phased in over a several year period. Blackened soil in the burned areas may be visible for a week or two until the ground layer vegetation regenerates.

Pine plantations will be managed to approximate the composition of adjacent naturally-occurring pine/oak stands. The Crandall plantation will be managed to promote an "old-growth" red and white pine forest similar to the surrounding natural forest. Plantation pines will be thinned selectively, creating gaps to allow other tree species and understory plants to become established. Harvest will be conducted in phases over several years to maintain the scenic qualities of the groves of larger pines.

Cutting of trees, especially in the Crandall Pines, may be perceived negatively by visitors to the natural area. Signs explaining the techniques and goals of plantation management will be used to educate the public and special care will be taken to conduct harvests in an aesthetically pleasing manner.

## **2. Management Prescriptions for Natural Communities**

This section contains brief prescriptions for managing the natural communities found in the natural area. The property manager, in collaboration with natural area management specialists, will develop specific methods and timetables for managing individual sites within the natural area using the following guidelines.

See the Vegetation Cover map (Figure 2) for locations of natural community types.

### **a. Northern Dry-Mesic Forest**

This community type is dominated by pines (white and red) and oaks. It is the predominant cover type in the Lower Dells, on Louis' Bluff and in narrow bands paralleling the Wisconsin River's main channel. Management will consist of removing invasive exotic species when

found. South of Witches Gulch, several planted spruce and fir trees will eventually be removed. The timing of removal will coincide with nearby pine plantation management. The projected cover type will remain unchanged for the long term.

#### **b. Northern Mesic Forest**

This community type is comprised of hemlock, white pine, and northern hardwood species. It occurs primarily in the canyons tributary to the main Wisconsin River channel, especially Coldwater Canyon, Witches Gulch, and Artist Glen. Management will be limited to removal of invasive exotic species. The projected cover type will remain unchanged for the long term.

#### **c. Southern Dry-Mesic Forest**

This community type is dominated by a mixture of oaks, primarily white, bur and red oak. Large blocks of this type are found south of Stand Rock and in a broad band between Artist Glen and Crandall's Bay. Management will consist of removing invasive exotics. Small-scale prescribed burns may be used in some areas. Planted conifers in the mixed oak areas will be harvested in conjunction with pine plantation management on adjoining stands. The projected cover type will remain unchanged.

#### **d. Mixed Dry Forest**

This community type contains several oak species, including black and Hill's oak, along with jack pine and lesser numbers of white pine trees. This type grows on the driest, most nutrient-poor areas. It is found west of Stand Rock, on the slopes above Gulch Creek west of Highway 13, and in the northern portion of the Old Indian Village site. Due to the limiting environmental conditions, the jack pine, especially, do not attain large size. A harvest of the merchantable jack pine may occur. The objective of the harvest will be to change the composition to mostly oak. However, a significant component of jack pine will persist. Black locust trees seriously infest portions of this community and will be controlled using basal bark applications of herbicides. The projected cover type will remain unchanged.

Some areas in this cover type contain oaks with spreading, open-grown forms indicating these sites were former oak/pine savanna. They include the southern portion of the Old Indian Village site, Fireman's Park, the easternmost portion of the Gulch Creek corridor, and the area south of the municipal wastewater treatment plant. These sites are excellent candidates for savanna restoration. Savannas are open grasslands with widely spaced trees, generally oak. Management will involve removal of invasive exotics, thinning non-native and native understory trees, and applying prescribed fire. Prescribed fires will necessitate the prior establishment of firebreaks around the periphery of the area to be burned. These breaks will utilize water, roads, trails, or railroad tracks wherever possible. Additional breaks will be constructed by hand. Cut woody material and standing dead trees will be burned in winter prior to the first prescribed burn to reduce combustible fuel. The burn interval will be two years in a row initially, and once every five to eight years thereafter. The projected cover type will be savanna, with scattered open-grown oaks over a dense herbaceous layer of grasses and wildflowers.

#### **e. Dry Prairie**

A few very small (less than  $\frac{1}{4}$  acre) dry prairie remnants are found on extreme slopes above some of the massive sandstone cliffs. They are not indicated on the Vegetation Cover map. The inaccessibility of these prairies effectively precludes their management. Removal of woody species and prescribed fire will be used to manage any sites that are accessible.

#### **f. Floodplain Forest**

This community type consists of silver and red maples, river birch, ash, and elm on wet soils in the Wisconsin River floodplain. The shoreline between Stand Rock and Louis' Bluff harbors the majority of this type in the natural area. Management will consist of removal of exotic species when found. The projected cover type will remain unchanged.

#### **g. Exposed and Shaded Cliffs**

These community types are not indicated on the Vegetation Cover map. They are relatively small, linear, vertical features imbedded in other cover types, primarily northern mesic and northern dry-mesic forest. They are vegetated primarily by species found in the surrounding community type, along with lichens, bryophytes, and ferns. Of special significance are several rare plant species found on the cliffs. The gorges of Witches Gulch, Coldwater Canyon, Artist Glen, and Roodes Glen, as well as the cliffs fronting the main river channel, embrace fine examples of these community types. Exposed and shaded cliffs will generally be managed the same as the community type surrounding them. See Section V.C.3. below for special prescriptions for managing rare plant populations on cliffs.

#### **h. Conifer Plantations**

There are ninety-one acres identified as red and white pine plantations in the forest reconnaissance conducted in 1995, the largest being the Crandall Pines south of Witches Gulch. This plantation is not large enough to establish adequately-sized demonstration blocks of different harvest regimes. Management will complement the adjacent northern dry-mesic forest by thinning the large pines enough to permit establishment of oaks and young pines in the understory. The plantations will be selectively cut to result in a naturally appearing stand. Thereafter, natural processes will determine tree species composition and abundance. The smaller plantations north of Witches Gulch and west of the river north of Blackhawk Island will be managed to complement the surrounding landscape. In plantations adjoining oak woods, the existing pine will be used as shelterwood to establish oaks. The projected cover type will be northern dry-mesic forest.

#### **i. Alder Thicket/Shrub Swamp**

This community type features tall shrubs, such as alder and willow, on wet soils. Small areas of this cover type are found along Gulch Creek and west of Louis' Bluff. No management is expected unless exotic species, such as purple loosestrife, is found. The projected cover type will remain unchanged.

#### **j. Open Wetland**

Open wetlands on the natural area consist of disturbed sedge meadow/marsh dominated by grasses and sedges. The city-owned wetland northwest of the wastewater treatment facility is the only example of this type in the project area. The wetland has been severely disturbed by past ditching, tilling, and grazing and retains little natural area character. No management is anticipated for this site. The projected cover type is shrub swamp, as wetland shrubs invade the site over time.

#### **k. Sandbar/Beach**

This cover type is found on river-deposited sands along the Wisconsin River. It is dominated by early successional herbaceous species interspersed with expanses of sand devoid of vegetation. Several large and small sandbar/beaches are scattered throughout the corridor. Only the largest are indicated on the Vegetation Cover map. All are subjected to periodic inundation which keeps them in an early successional stage. No vegetation management is required to maintain this type.

#### **l. Soft, Cold, Slow Stream**

This community type, represented by Gulch Creek, is not indicated on the Vegetation Cover map. The soft-water, cold, slow-moving stream is embedded in the cover types adjacent to it. No vegetation management is required to maintain it. The stream should be protected from manipulations to its course or flow.

#### **m. Agricultural Land/Pasture**

This type is currently in agricultural production or is being grazed by livestock. Land in this type is found west of the river between Blackhawk Island and the Cambrian Overlook, north of Witches Gulch, near Louis' Bluff and adjacent to Coldwater Canyon. None of these lands are currently owned by the Department, but are within the boundary to provide a buffer for the natural area. When agricultural lands are purchased, they will either be allowed to revert naturally to the surrounding community type and may be enhanced with grassland cover plantings where appropriate, or remain in crop production through share-cropping or other land-use agreements. Management will consist of suppression of invasive exotic species.

#### **n. Old Field**

This community type consists of old pastures and agricultural lands left fallow for several years. The open lands north and south of Artist Glen represent the largest acreage of this type in the natural area. Natural succession has begun to reclaim these areas to forest, and will be allowed to continue. Management will involve removal of exotic species wherever found. The projected type will reflect the adjacent community type.

#### **o. Disturbed/Developed Areas**

This type consists of areas of severely disturbed vegetation, or areas devoid of vegetation. Disturbed areas amenable to vegetation restoration, such as the Sunset Cabins area and the

dredge spoil deposit site south of Witches Gulch, will be restored, where practical, using native seed collected from the surrounding area or provided by the Department's Native Plant Seed Farm.

### **3. Rare Plant Management**

As enumerated in the Resource Inventory section, several state- and globally-significant populations of rare plants inhabit the natural area. Accordingly, special attention will be given to preserving this critical resource.

All of the rare plant species known to inhabit the natural area are confined to cliffs. Because they occupy relatively inaccessible niches, these plants are inherently less susceptible to some of the threats, such as over-browsing and competition from invasives, that plague other terrestrial plants on the property. For example, white-tailed deer don't appear to be damaging the majority of the cliff vegetation as they can browse only the lowest portions of rock faces accessible from below.

In general, rare cliff plants will be managed in concert with the natural community type in which they occur. Maintaining the biological integrity of the shaded and exposed cliffs should preserve the majority of rare species found there. Establishment and enforcement of closed zones prohibiting visitor access to sensitive cliff and canyon areas will help ensure that rare plants are not trampled by climbers. The general biological status of rare plants will be monitored by conducting periodic (three-to five-year) population censuses of each species.

Two plant species merit special management attention: fragrant fern and lapland rosebay. Fragrant fern was once more common in the Dells region than it is today. The population decline is a result primarily of over-collecting. An experimental program now underway will propagate and outplant young individuals of fragrant fern to appropriate cliff sites in the natural area. Genetic material collected from one of the two known populations in the Dells is the source material for the outplantings. A special monitoring plan will be developed to help determine the efficacy of this augmentation program.

Lapland rosebay is also believed to have suffered a decline in numbers at the Dells as a result of indiscriminate collecting and, perhaps, by inundation when the dam was constructed. The single remaining population is situated on a small, cantilevered ledge whose base is being eroded by the Wisconsin River. A single catastrophic event, such as the collapse of the ledge, could eliminate the majority of the population. A project to propagate rosebay plants from seeds or cuttings and outplant them to at least one other site in the natural area will be initiated when time and funds permit. In the interim, spalling and erosion of the cliff supporting the rosebay will be closely monitored and remedial action taken if the population is immediately threatened.

#### **D. Wildlife Management and Hunting**

Wildlife management in the natural area will ensure biological diversity and protection of the natural values associated with the property. Habitat manipulations normally associated with lands having wildlife production as the primary goal will not be part of the management of the property due to the natural area classification. Management activities that restore or enhance native communities such as oak savanna may benefit certain game and nongame species that thrive on these types of habitat.

The primary wildlife management on the property will be control of deer populations through hunting to reduce overbrowsing of native plants. Deer have had a large negative impact on native vegetation and adjacent croplands. The goal is to reduce deer populations to be within overwinter goals for the area Deer Management Units, twenty-five deer per square mile in the Upper Dells (Unit 54C), (54B) and thirty-five deer per square mile for the Lower Dells (Unit 70E).

Deer hunting on the natural area will coincide with existing statewide seasons. The firearm season for deer will be open during the statewide nine-day season, the seven-day muzzle-loading season, and any special seasons that may be enacted as part of statewide herd reduction efforts. Bowhunting for deer will be open in accordance with the statewide regular season. In the portion of the natural area that is within the City of Wisconsin Dells firearms cannot be discharged. Consequently, bowhunting by city approved permit only, is proposed for that area.

Small game hunting will be allowed in accordance with the regular seasons, except for spring wild turkey hunting. The spring turkey season will be open through the third period only, which usually closes around the end of April. This will help to minimize potential conflicts with hikers and other visitors to the property. Implementation of this limited turkey season may require revisions to existing administrative rules.

Furbearer trapping will be allowed in accordance with state regulations and usually begins in mid- October. It is anticipated that furbearer trapping on the property could aid in reducing crop damage and nuisance complaints on neighboring lands. Raccoons and skunks have both been identified as problems by residents of the area.

Hunting will be monitored, particularly during the first years of open seasons, to determine if any safety concerns or user conflicts necessitate modifications to the hunting seasons. It is important that sufficient flexibility be retained so that changes can be made if needed following the first years of implementation. If the Department determines that changes in the hunt are necessary then the situation will be reevaluated as part of the statewide review that is done every three years for all Deer Management Units.

## **E. Recreation Management and Development**

### **1. Public Access**

Visitor use will be controlled by channelling the public to designated areas on the property and closing portions of the natural area. Areas not designated for a particular purpose, such as hiking or picnicking, will be available for informal use but they will not be maintained to any recreational use standards, nor will they be promoted for such use. The property will be open for foot travel only. Designated land access points to the natural area will be located at the Cambrian Overlook, Chapel Gorge Trail, and the Crandall Pines. Parking areas will be provided at all three sites. A two-mile loop hiking trail at Chapel Gorge and a three-hundred-foot disabled-accessible path from the parking area to the observation deck at the Cambrian Overlook will be developed.

A closed zone will be established along canyon areas and on both sides of the river corridor where the rock outcrops and steep cliffs are located. This zone will be closed to the public in order to protect sensitive geological features, rare plants, and natural communities. The closed zone will generally be two-hundred feet in width along the river corridor, but, where appropriate, may be narrowed to no less than seventy-five feet, particularly on the west side of the river. Some closed areas may be wider than two-hundred feet. Closed areas along the interior canyons will average fifty feet in width. The steepness of the terrain behind the cliff areas and proximity of fragile resources will be the primary factors used to determine the width of the zone. While not the primary reason for their creation, the closed areas along the cliffs will also help ensure visitor safety by reducing the chance for accidental falls by users. The closed zone will be marked with appropriate signs and will be indicated on property maps available to the public.

Sandbars along the river corridor accessible by boat will remain open for public use with restrictions. Closed zones will begin landward of the sandbars where the cliffs begin, or at the first line of permanent vegetation, whichever is closest to the water. Walk-in access to the river will be permitted at the Chapel Gorge Trail, Romance sandbar, and the Cambrian Overlook. Access to the river at these locations is available through gently sloping terrain between rock cliffs.

The Lower Dells will also have a closed zone along the river corridor where steep rock cliffs are located. The sandbars and upland areas near the end of Bowman Road will be open for access by water. However, land access from the end of the road will be closed. Concerns with lack of parking space, increased traffic, and enforcement problems at this dead-end road necessitate this closure. This access point could be considered for overland access (no parking provided) at some point in the future in the off-season (between Labor Day and Memorial Day) as visitor demand and behavior dictate.

### **2. Public Use Areas**

The property will contain specifically designated areas to provide passive recreational opportunities while limiting potential negative impacts to the natural area from these uses. This will allow management of visitors by providing designated use areas at dispersed locations

within the natural area where recreation can be accommodated. This will also help to channel use away from areas where it cannot be accommodated.

The following sites are planned for recreational use developments:

#### **a. Cambrian Overlook**

Historically known as Prospect Point, this is the site of the former Cambrian Lodge. The high bluff here offers a commanding view of the Wisconsin River, Louis' Bluff, and the mouth of Witches Gulch. This site will most likely receive the most use of any of the uplands in the natural area. All of the existing lodge buildings will be removed and the site restored to a natural condition. Some of the existing roadway will be removed. Most of the old utility lines and the septic system will be abandoned. A twenty-four car hard-surfaced parking area will be constructed along with a three-hundred-foot disabled-accessible trail leading to the existing wooden observation deck. The existing deck is accessible and structurally sound and will remain intact. A sheltered interpretive kiosk will be constructed to provide information on the natural area.

Three to five picnic tables, benches, drinking fountain, and vault toilet will be provided.

Approximately four-hundred feet of rustic wood fence will be placed along the cliff to provide for visitor safety. Foot access to the river will be via the old boat launch road. This road will be maintained or redeveloped for management purposes.



View of Upper Dells from Cambrian Overlook, with existing observation deck in foreground. *Photo by Ingrid Laas*

#### **b. Chapel Gorge Trail**

This site will include a two-mile loop hiking trail that leads from River Road to a sandbar on the river locally known as Birchcliff Beach. The trail will generally follow an old service road, wind through a variety of habitat types, and offer views of Chapel Gorge. Small sections of the trail may need to be relocated off the old service road. This will be a lightly developed trail with a grass, earth or wood chip surface. A ten-car graveled parking area will be constructed next to River Road at the trail head. Interpretive signs (four to five) and benches will be provided along the trail. A vault or composting toilet will be placed on the high ground above the sandbar and will be well-screened from view from the river.



### **c. Crandall Pines**

The Crandall Pines area, directly west of River Road, is one of the largest blocks of wooded land on the natural area. It has a number of existing, non-designated paths and old service roads that wind through it. No trail will be designated or maintained at this location; however, the paths will be open for hiking, skiing, and snowshoeing. A five to ten car gravel parking area will be located next to River Road. An interpretive sign will also be placed in the pine plantation to illustrate pine plantation management principles.

## **3. Potential Future Public Use Areas**

The following areas were considered for potential public use. Because development of these areas depends on future acquisitions, uncompleted plans of other agencies, or unknown visitor use demands and behavior data, they will not be developed at this time. If the developments were actually proposed, the public would be invited to participate in a decision-making process encompassing all the relevant issues.

### **a. Coldwater Canyon**

If the upper reaches of the canyon between River Road and State Highway 13 are acquired, a one-mile hiking trail would be developed in the base of the canyon. The trail would provide an opportunity for visitors to view flora and fauna characteristic of a canyon environment. A small parking area would also be provided near Highway 13.

### **b. Ice Age Trail**

The property may be considered for segments of the Ice Age Trail at such time as that corridor is planned if it is compatible with the goals of the natural area. It is not known at this time where the Ice Age Trail corridor will be located. This trail will be sited through an Ice Age Trail planning process.

### **c. Old Indian Village (Timber Falls)**

This area is located within the City of Wisconsin Dells on the west side of the river. Old paths exist in this area that follow the river corridor some distance back from the cliffs and they have the potential to be developed into a short loop trail. There is limited space that could potentially be used for parking, but there is some uncertainty with regard to ownership. There are concerns with visitor misbehavior in this location because of the relatively isolated location within the city, and the close proximity of some areas of the path to the cliffs. Depending on demand and experience with visitor behavior on the natural area, development of this area may be evaluated further.

### **d. Lower Dells Vista**

This site of approximately ten acres is located in the Lower Dells between County Highway A and the west side of the Wisconsin River. If acquired, this site would provide a small parking area and a short trail to a high vantage point overlooking the river and cliffs of the Lower Dells. This area contains significant historical value, as it is the site of the "Lost City of

Newport". Also, rare plants are found on the cliffs here. The parking area and trail would be located in a manner that would not conflict with the existing amphibious "duck" trails.

#### **4. Public Use Restrictions**

The natural area will be limited to foot travel only for low intensity recreational uses such as hiking, skiing, nature appreciation, and hunting. No ski trails will be designated or maintained, but the property will be open for winter uses such as skiing and snowshoeing. Camping, fires, and charcoal grills are prohibited on the natural area. Some of the following restrictions will require revisions to Chapter NR 45, Wisconsin Administrative Code.

The following other restrictions apply:

##### **a. Property Hours**

The property will be closed to public access from 10 P.M. to 5 A.M. from May 15 to September 15. The rest of the year the property will be closed from 8 P.M. to 5 A.M.

##### **b. Sandbar/Shoreline Area**

Sandbars will be open for public use with restrictions. Sandbars will not be managed as beaches and no facilities or services will be provided. Overnight mooring of watercraft is prohibited on the sandbars.

##### **c. Refuse/Litter**

Glass containers will be prohibited on the natural area to protect visitors from broken glass, especially on the sandbars. All trash is on a "carry in/carry out" basis. Refuse containers will not be provided on the property.

#### **5. River Corridor Management**

The Wisconsin River in the Dells receives very intensive boating use in the summer causing visitor conflicts and safety concerns. Department efforts to reduce these conflicts in order to provide a safer, more enjoyable boating environment will continue. Ongoing partnerships to enforce boating safety laws on the river will be continued and expanded as feasible. The county Sheriff's Departments provide a boating safety patrol funded through the DNR boating safety program. Local townships may also participate in expanded efforts to increase boating safety such as placement of channel markers or regulatory buoys in the river.

Department wardens also provide assistance with boating safety enforcement on the river. If available, federal boating safety funds will be used to provide an additional seasonal warden position to assist with this effort. The Dells natural area property manager and limited term employee (LTE) staff will have law enforcement credentials and will occasionally assist with on-water enforcement. Efforts will also be made to make river users aware of existing boating laws and the consequences of violating these laws. This may include posting signs at landing areas and working with those that rent watercraft to make certain their patrons are aware of boating regulations.

Although the Department recognizes the severity of the boating problem in the Upper Dells, it has no authority to regulate the number, size, or speed of watercraft in this portion of the river. No-wake zones and similar regulations must be legislated at the local level. The Department will cooperate with municipal, township, and county officials should they wish to enact such laws.

## **6. Recreational Use Monitoring**

It is very important to continually monitor visitor use patterns and behavior on the natural area to determine if the goal and objectives of this plan are being met. Since these lands have been closed previously, the intensity of use and visitor demand can only be estimated at this time. If visitors have a negative impact on the natural area, appropriate management actions will be taken to mitigate the impacts. Management actions may include restructuring use, or closing a site and relocating the use to another appropriate area, if possible. Any changes in this master plan will be made in accordance with the provisions of Chapter NR 44, Wisconsin Administrative Code.

The general philosophy underpinning the management components of this master plan is the capability to be flexible, enabling the property manager to adapt to unanticipated conditions. In addition, in the future it may be possible to offer additional opportunities to visitors if it is determined that user intensity and behavior will not have a negative impact on the area.

## **F. Education and Interpretation**

An important purpose of natural areas is to provide for education and appreciation of unique natural resources and rare features. This natural area is particularly important for nature interpretation because of its internationally-renowned geological features and its location within a very popular tourist area. Cultural and historical heritage, particularly that of native tribes will also be recognized as part of natural area interpretive projects.

The commercial boat tours will continue to provide quality educational opportunities for visitors within the river corridor and in the leased areas at Witches Gulch, Stand Rock, and Coldwater Canyon. The natural area will provide additional opportunities for land-based education through the placement of a kiosk, interpretive signs, printed educational materials and local partnerships for interpretive displays at locations outside of the property. Cooperative arrangements will also be pursued to enhance the boat tours regarding explanation of natural area characteristics, and to implement locally guided, land-based educational tours.

Although an interpretive center is not planned to be located on the natural area, there is a potential to provide a natural area exhibit in cooperation with the H.H. Bennett Museum in downtown Wisconsin Dells. This opportunity will be pursued as a future possibility, dependant on funding.

Interpretive signs on the property will be carefully designed to fit in with the character and objectives of the natural area. If any interpretive signage is cooperatively funded with another organization or business, recognition for the funding partner may be given on the sign in a limited manner that does not detract from the character of the natural area.

The following interpretive projects are planned:

### **1. Cambrian Overlook**

An interpretive kiosk at this site will provide information on the natural and cultural history and geology of the Dells.

### **2. Chapel Gorge Trail**

Placement of four or five interpretive signs along the hiking trail will highlight the vegetation and geology of this area.

### **3. Crandall Pines**

An interpretive sign will be placed in the plantation to provide information on pine plantation management.

### **4. Educational Materials**

Various types of educational materials will be produced such as brochures or audio tapes. These materials could be made available on commercial boat tours, and through other sources in town such as the visitors bureau. Department staff may occasionally present interpretive programs or participate in community events to promote the features of the natural area.

### **5. Cooperative Efforts**

Department staff will be available to provide training and information to commercial tour boat guides and volunteers on aspects of the natural area that may not be a part of existing tours. Volunteers may lead structured tours on land to provide educational opportunities not otherwise available.

## **G. Operations and Administration**

The natural area will be managed by a permanent property manager currently stationed in the Wisconsin Dells, with assistance from LTE staff. They will have the primary responsibility for day-to-day operations, maintenance, public contact and enforcement on the property. The property manager and at least one LTE will have law enforcement credentials. Their primary law enforcement responsibility is to provide for visitor safety and enforce natural resources laws on the natural area's uplands and adjacent sandbars. Occasionally, they will assist with boating safety enforcement on the river.

Management of the natural area will follow existing regulations established for Department-managed properties unless exceptions are enumerated in Chapter NR 45, Wisconsin Administrative Code. Property-specific rules for the Dells of the Wisconsin River State Natural Area will be incorporated into Chapter NR 45 to address property hours, glass container restrictions, and prohibitions on the use of charcoal grills. Additional provisions for disabled accessibility will be reviewed on an ongoing basis.

The Department will be sensitive to the natural and aesthetic values of the property in its management and development activities. Development will blend in with the natural surroundings and have minimal intrusion into the river viewshed. Existing buildings in the natural area that are not part of leased areas will be removed unless they are needed for interpretive or administrative purposes.

### **1. Shop/Service Building**

The shop/service building will be used for storage of vehicles and equipment used on the Dells natural area, Quincy Bluff natural area, and other natural areas in the region. This building may be located in the old Sunset Cabins area. Other locations within and outside of the natural area are also being considered.

### **2. Access Control /Service Gates**

Many unimproved service roads exist throughout the uplands. Some of these service roads will continue to be maintained for maintenance and management activities and to provide access for emergency response and fire control purposes. Some roads will be gated or screened with vegetation to discourage use in inappropriate areas.

The Department holds easements across private lands to provide access for staff to conduct maintenance and management activities on the property. With the exception of the easement at the Cambrian Overlook these easements are intended for staff use only and are not public access points. These easements are closed to public use.

### **3. Leased Areas for Commercial Boat Tours**

Dells Boat Tours holds a fifteen-year renewable lease on fifty-five acres at three areas of the property--Witches Gulch, Coldwater Canyon, and the Stand Rock Indian Ceremonial site. Portions of Coldwater Canyon remain in private ownership and Dells Boat Tours has separate private agreements to use those areas. The lease was agreed to as a condition of the initial sale of the natural area to the Department and provides for the continued use of the three areas as shore landings for the Upper Dells commercial boat tours. The lease agreement guides the operation of those areas and existing facilities. Upgrading of leased facilities will be on an ongoing basis according to the agreement.

If the lease is discontinued for any reason by Dells Boat Tours prior to the end of the term it may be transferred by them to another party. Transfer of the lease is subject to Department approval. If the lease is discontinued and Dells Boat Tours is not able to transfer to another party, the Department will evaluate continuing operation of the leased landing sites. Likewise, at the expiration of the lease's fifteen-year renewable term, the Department will reevaluate what types of operations will be continued for the succeeding term. The natural area manager will be the liaison with the lessee regarding management issues and implementation of provisions of the lease.

#### **4. Long Term Public Involvement**

The Department will maintain close contact with the public to keep them informed about management and development issues related to the natural area and to receive their input. This may include newsletters or periodic public meetings. The natural area property manager will be the main contact person for providing information and responding to public questions regarding the property.

#### **H. Development and Operations Costs**

##### **A. Estimated Cost and Funding Source**

The following is an estimate of costs for management and development of the natural area. These costs are in 1996 dollars and do not account for future inflationary changes.

##### **1. Capital Development Costs**

Cambrian Overlook (Parking area, interpretive kiosk, toilet, fencing, disabled path, site prep, repaving)	\$ 90,700
Chapel Gorge Trail (Parking area, interpretive signs, toilet, trail grading)	\$ 29,700
Crandall Pines Parking Area	\$ 7,000
Rebuild Service Road Entrances on River Road	\$ 11,000
Signs and Gate Installation for Access control	\$ 9,700
H.H Bennett Museum Display	\$ 3,000
Natural area property sign (two)	\$ 2,500
Patrol boat, motor, trailer	\$ 12,000
Shop/Storage Building	\$ 100,000
<b>Total Capital Development Costs</b>	<b>\$ 265,600</b>

##### **2. Annual Operating Costs**

Permanent salary + fringe (one FTE)	\$ 50,000
One LTE	\$ 15,000
Supplies and Services	\$ 10,000
<b>Total Annual Operating Costs</b>	<b>\$ 75,000</b>

##### **3. Estimated Land Acquisition Costs**

The total estimated costs to acquire all lands and lower-value improvements is estimated to be \$1,980,500 for 1,065 acres of land. Lands with significant developments are excluded from

project acquisition goals. Lower-value improvements generally are buildings less than \$50,000 in value.

### **B. Attached Maps**

The following maps are included with the master plan:

- a. Ownership and Recreational Facilities
- b. Vegetation Cover
- c. Land Classification

## **VI. ALTERNATIVES TO THE MASTER PLAN**

### **A. How The Alternatives Were Developed**

These alternatives were developed to address management issues identified by the Citizen Advisory Committee, general public, and Department staff. Of singular importance in the process of developing and evaluating these alternatives is the overall goal for the property, preserving and enhancing the natural and scenic qualities while providing for compatible public uses.

The alternatives outlined here have been summarized from a more extensive document addressing and analyzing all the issues in as detailed a manner as possible. This document, comprising thirty-four pages, is available upon request. The management alternatives presented here represent four major categories: recreation management and development, vegetation management, hunting, and project boundaries. These categories provide a framework to address the key management issues under the appropriate general headings.

### **B. Alternatives Directed By State Natural Area Designation**

The designation of the property as a State Natural Area directs the types of management in the plan and sets the tone for the kind of use that may occur. State Natural Areas are not intended for intensive recreational uses, but are commonly used for passive recreation, nature appreciation and education. These areas are generally open to the public unless environmental protection measures are required to preserve sensitive resources on the property. Preservation of the rare features and aesthetic qualities contained within the property is imperative. No uses of the property may be permitted that are inconsistent with, or may cause damage to, the natural values.

The following alternatives have been considered in developing a management plan for the natural area.

### **C. Recreation Management and Development**

#### **Alternative 1. No development and no special provisions for recreational uses.**

Under this alternative, there would be no development or management for recreational uses on the property. This alternative calls for maintaining the property as it presently exists. There would be no provisions for increased public uses beyond what presently exists within the river corridor and in the areas leased for commercial boat tour landings. The uplands would have no developed access or facilities and would be closed to public use. The sandbars would remain open to existing uses.

It should be noted that closing sandbars to public use was evaluated, but that it was determined that it would be impractical to close these areas. The sandbars have traditionally accommodated significant public use and do not contain any rare species. However, littering is an ongoing concern on the sandbars that needs to be further addressed.

This option would provide maximum protection for the property from potential damage due to visitor use or misuse. Prohibiting visitor access to the uplands would decrease the chance that



rare plant species, geological formations, and other natural features could be damaged by visitors.

Plant surveys on the property have shown that all rare plant species are located in the cliff and canyon areas. Sensitive plants would be protected by closing these areas to the public. Consequently, there is no justification for closing the upland areas where no rare plant species exist.

There is also no compelling reason or justification to deny reasonable public use by entirely closing the uplands to public access. Closing all the uplands to the public would be inconsistent with management of other natural areas and other publicly-owned lands in Wisconsin. Other State Natural Areas are open to the public except for small portions of some properties that contain populations of sensitive species. Moreover, there is a demand for public access and recreational use of this property that has been demonstrated through public open houses, visitor use surveys, and other public comments.

This alternative is not recommended.

**Alternative 2. Provide limited access to the property by designating use areas, access points, and designated closed zones. Public use facilities would be provided to accommodate low numbers of visitors with minimum impact to the property.**

This alternative would allow for controlled access to the property by providing for public use at a few appropriate locations. Directing use to these locations would provide recreational opportunities while still protecting sensitive resources. Day-use facilities, including parking areas, toilet facilities, and a trail, would be located at the Cambrian Overlook and Chapel Gorge. An additional parking area would be located at Crandall Pines next to River Road. These areas were determined to be the most appropriate for visitor use due to their location, scenic beauty, and potential for nature interpretation. Use can be accommodated at these locations with minimal impacts to the natural and scenic qualities of the property. In addition, having designated use at a few key locations allows for more efficient monitoring and control of public uses.

Identified areas that could potentially be degraded due to visitor use or abuse would be protected by the creation of closed zones. Biological surveys have determined that nearly all sensitive plants and geological formations are associated with the cliffs along the river and in the canyons. Closing these areas to public use would not only protect plant resources from degradation, but would also protect easily erodible sandstone cliffs. The closed zones would parallel most of the river corridor and canyon areas. The zones would average two-hundred feet in width along both sides of the river and fifty feet in width along the canyons. Width of the zones would be based on topography and the potential for negative impacts to the area. Areas outside of the closed zone would be open for informal uses such as hiking and bird watching.

Accommodating public uses on the property does entail some risk in that negative impacts to natural area values could conceivably occur due to visitor use or abuse. Concerns raised by the public regarding the potential for conflicts or damage to resources include wildfires, littering, public safety, and loss of solitude. Since the upland portion of the property has not been open for public use previously, it is difficult to gauge the extent of public use that may

occur in this area. Visitor-use restrictions regarding property hours and prohibitions on fires, charcoal grills, and glass containers have been evaluated and would be put in place to control misbehavior and littering.

By restricting access and providing effective enforcement of property rules, preservation of the natural and scenic beauty of the property can be accomplished while still allowing compatible public uses. It is important that visitor use patterns be monitored on an ongoing basis to ensure these uses are properly managed and are not degrading natural area values. As mentioned above in this document the general philosophy underpinning management of this property is the capability to be flexible and to be able to respond to unanticipated circumstances.

This alternative is recommended.

**Alternative 3. Provide expanded public use facilities and open the property completely for public access.**

This alternative would provide more opportunities for recreational use and allow access to the entire property, including areas containing sensitive resources. More trails, toilet facilities, and expanded day-use opportunities would be provided. No closed zone would be in effect.

Providing expanded public use facilities would not be compatible with natural area objectives. Increased public use would potentially result in more littering, noise, and visitor conflicts and would require more enforcement. If the cliffs and canyons were made accessible to the public, rare plants could be damaged and rock formations defaced. The potential for visitor accidents on the steep cliffs could also increase.

This alternative is not recommended.

**D. Wildlife Management and Hunting**

**Alternative 1. Prohibit all hunting on the natural area.**

Prohibiting hunting would not be consistent with management of other natural areas in Wisconsin which are generally open to hunting. Hunting of deer, in particular, is needed to help control an overpopulation that is having a visible impact on vegetation within the natural area and on adjacent lands. Adjacent landowners have noted considerable damage to crops and ornamentals. There also has been a large number of vehicle/deer collisions in the area due to the high number of deer.

No hunting on the property would preclude user conflicts between hunters and other visitors during the hunting seasons. However, it is expected that most use of the property is likely to occur in late spring, summer and early fall when hunting is not open.

This alternative is not recommended

**Alternative 2. Conduct a limited hunt.**

A limited hunt could be conducted by restricting type of weapons used (e.g. bow, muzzle-loader), species hunted, season lengths, and hunter numbers. These methods could provide a means to have more direct control over the hunt to achieve desired results such as a potentially

safer, higher quality hunt. Any controlled hunt would require a substantial increase in enforcement and administrative costs.

The relatively small size of the property, limited access due to surrounding private lands, and the disjointed irregular boundaries would make it very difficult to properly manage and enforce a special hunt. As most adjacent lands are included in the statewide regular rifle season for deer, a limited hunt could create hunter confusion and enforcement difficulties. State lands at Rocky Arbor State Park and Camp Upham Woods are currently not open for hunting, but are being considered for a deer hunt. These properties also need to be included in a deer hunting plan if deer populations in the area are to be reduced to acceptable levels.

A limited hunt option may not be reasonable or necessary when one considers that only five-hundred to six-hundred acres of the 1,050-acre property is available for hunting. This figure is derived by subtracting the area included in the closed zones, land within the city limits (where discharge of firearms is illegal), and leased areas from the total property acreage. Access to the property for hunting is very restricted by adjacent private ownership and limited road access. It also should be noted that by state law no firearms may be discharged within three-hundred feet of any building without the owner's permission. These factors combined may help to make hunting on the property self-limiting.

This alternative is not recommended.

### **Alternative 3. Allow deer and small game hunting in accordance with existing state regulations.**

This alternative would allow deer and small game hunting during the regular seasons. The wild turkey hunting season would be shortened to minimize potential conflicts with hikers in late spring. Land within the city limits would be open for bow deer hunting only by city permit.

Allowing deer hunting on the property during the regular seasons is likely the most effective method of reducing the deer herd in the local area. Reducing the number of deer would lessen their impact to native vegetation and crops. Controlling the herd in accordance with the regular seasons would also be the most cost effective for enforcement and administration. Part of the property is located in the 1996 statewide zone for additional deer harvest designated as Zone T.

Controlling the local deer population, especially on the west side of the river, will require coordinating a hunt with Rocky Arbor State Park and Camp Upham Woods, both of which currently prohibit hunting and thus act as deer refuges. The Department will work toward opening both of these properties for deer hunting.

Concern has been expressed about having the property open for a deer hunt simultaneously with the regular statewide season. Specifically mentioned was the safety of neighboring property owners and hunter overcrowding on the natural area. Since the property has not been open for public hunting in the past there is no history of experience with this issue. However, deer hunting occurred under boat company ownership for those that had permission. The layout of the property, with somewhat narrow, meandering ownership boundaries and fairly restricted access, may help to alleviate crowding and safety concerns. It should also be noted

that the prohibition on discharging a firearm within three-hundred feet of a building will essentially close off areas near residences. The closed zones along the river corridor and canyons will also be off-limits to hunting.

This alternative is recommended.

## **E. Vegetation Management**

### **Alternative 1. No active management, natural plant communities are not managed.**

This alternative would allow plant succession to proceed without management of any type. Invasive/exotic species would threaten the integrity of native plant community types in the natural area. Lack of management would result in conversion to undesirable communities dominated by more shade-tolerant species. The biological diversity and natural integrity of the site would be diminished.

The Crandall Pines and other pine plantations would be not be cut or managed in any way. The plantations would continue to grow slowly, and be more prone to windthrow/blowdown and disease. This would reduce the aesthetic qualities of the natural area.

Cost savings resulting from a reduced investment in staff time and materials could be realized through this alternative. Negative public perceptions regarding fire and tree cutting would also be avoided.

This alternative is not recommended.

### **Alternative 2. Manage natural community features to restore and maintain pre-European settlement conditions while allowing for natural processes to proceed.**

Plant communities would be managed to maximize biological diversity. Natural processes would be allowed, within reason to proceed. Exotic and invasive plant species would be removed by cutting and/or herbicide application and the use of prescribed fire would be employed to restore savanna and prairie areas and control plant succession. Dead and downed trees would not be removed unless determined to be a hazard to public safety. The Crandall Pines and other plantations would be managed to approximate the composition of adjacent natural forest stands. The appearance of the pines would eventually resemble an old-growth forest.

This alternative may cause concern among those perceiving management techniques such as prescribed fire and tree removal as having a negative impact on the natural area. This option will also require a fairly substantial investment in resources to remove invasive species and maintain savanna and prairie areas in an open condition.

This alternative would assure the restoration and long-term maintenance of the native plant communities which this natural area was established to protect.

This alternative is recommended.

**Alternative 3. Intensively manage the native plant communities.**

Under this alternative the natural area would be managed more intensely for multiple purposes. This would involve more active management to enhance wildlife habitat and timber production. Natural processes, such as plant and animal diseases and plant succession would be controlled to maximize benefits for the particular resource being managed. This management could reduce the aesthetic qualities of the site and have a negative impact on the wild character of the river corridor.

This alternative is not compatible with the goal of State Natural Areas to restore, protect, and maintain natural ecosystems.

This alternative is not recommended.

**F. Project Boundary**

**Alternative 1. Maintain current ownership.**

This alternative would not provide the desired level of resource protection for sensitive areas within and adjacent to the current property boundary. It would also result in decreased opportunities for public use and recreation in areas that could withstand that use. Gaps would remain in ownership and connections would not be made to nearby state lands at Rocky Arbor State Park and Camp Upham Woods. Opportunities for integrated management and creation of ecological corridors would be lost. The potential for incompatible uses and development adjacent to current ownership and within the project area would increase. In addition, the river corridor would not receive as much protection.

A benefit of this alternative is that it would not require additional land acquisition costs. Also, management costs would likely be reduced in the long term since there would be less land to manage.

This alternative is not recommended

**Alternative 2. Expand project ownership to include adjacent areas of natural significance and include additional lands to provide a wider corridor of protection**

This alternative would increase project ownership to 2,115 acres from the current ownership of 1,050 acres. Adjacent lands that contain sensitive resources, provide connection to other state lands, and provide a wider protective buffer to the river are included in the expansion. Gaps in the current ownership along the river corridor and small inholdings are also included in this alternative.

This boundary would provide increased protection for rare plant communities and adjacent canyon areas. It would also provide a larger protected area along the river corridor that would help to alleviate incompatible uses. More land may be available for public use that would assist in alleviating public use pressures in areas with sensitive resources. The connections to nearby state lands would also facilitate integrated management and provide an ecological corridor for a range of species. Additional costs would be incurred to provide for acquisition

of these lands. High value improvements would be avoided and not included in project acquisitions.

This alternative is recommended

**Alternative 3. Expand project ownership to include a larger area than what is needed for natural area protection.**

The project boundary would be expanded to include areas further upriver in the Upper Dells and downriver below the Lower Dells. This alternative would allow for increased protection for a larger area of river corridor. It would also increase the availability of lands for public use.

This expanded boundary area would provide little additional resource protection and would not meet the rationale of the designation of the property as a State Natural Area, protecting and preserving natural and scenic qualities while accommodating compatible recreational use. Substantial increased costs to acquire these lands would not be cost effective from a resource protection standpoint. Management costs would also be greatly increased and management efficiency would be decreased.

This alternative is not recommended.

## **VII. ENVIRONMENTAL ASSESSMENT**

### **A. Project Summary**

This environmental assessment is a Wisconsin Department of Natural Resources analysis that evaluates probable environmental effects of implementation of the Dells of the Wisconsin River State Natural Area Master Plan and determines the need for an Environmental Impact Statement (EIS). This assessment assumes the master plan will be implemented in its entirety.

The attached analysis includes a project summary and analyzes the environmental impacts of the master plan.

#### **1. General Description**

The master plan for the Dells of the Wisconsin River State Natural Area will guide management and development within the natural area for at least the next fifteen years. The plan was developed by:

- An eight-member, multi-disciplinary Department Master Plan Task Force composed of resource managers, real estate specialists, planners and resource specialists
- An eighteen-member Citizen Advisory Committee
- Other Department staff
- Members of the public and independent organizations

The Dells of the Wisconsin River State Natural Area Master Plan will:

- Add 1,065 acres of land to the existing acreage of 1,050 acres. The additional acreage will include areas of unique habitat, provide connections to other state lands, and provide a protective buffer to the Wisconsin River corridor.
- Manage lands to restore and maintain natural plant and animal communities, geological features, and rare species while allowing natural processes to proceed.
- Provide recreational opportunities on the natural area that are compatible with protection of sensitive resources.

#### **2. Purpose and Need**

The natural area has been established to protect habitat for rare species and to protect unique natural and scenic qualities along the river corridor. Surrounding lands not currently within the natural area also contain unique natural features that include cliff and canyon environments, and adjacent habitat that, if developed, could have detrimental impacts to the natural area. Including these lands within the boundary will also provide a protected buffer to the natural area and link adjacent state lands to create a continuous protected corridor.

### **3. Authorities and Approvals**

Lands will be acquired and managed under State Natural Areas Chapter 23.09 s.s. Natural Resources Board approval is needed for this project.

### **B. Physical Changes**

#### **1. Structures**

The master plan includes a limited amount of development on the property. Existing structures will be removed from the Cambrian Lodge, Sunset Cabins, and Fireman's Park sites. After these buildings are removed the sites will be restored to as natural a condition as practical.

Interpretive facilities will be placed on the property, including an interpretive kiosk at the Cambrian Overlook and interpretive signs on the Chapel Gorge trail. A hard-surfaced parking lot will be constructed at the Cambrian Overlook along with a three-hundred-foot disabled-accessible trail to an existing observation deck. Parking areas will also be constructed adjacent to River Road at Crandall Pines and the Chapel Gorge trail head. These parking areas will be small graveled lots that are currently in grassy cover. The trail at Chapel Gorge will follow an existing service road for the most part but may need some relocation which would entail some clearing of vegetation.

Vault or compost toilets will be placed at the Cambrian Overlook and at the Chapel Gorge trail. These toilets will be placed where they are screened from view from the river.

A shop/service building for storage of equipment and materials may be constructed at the old Sunset Cabins site. Other locations within and outside of the natural area are being considered. The building will be placed so it is well-screened from the river.

#### **2. Service Roads and Paths**

Many service roads and paths exist throughout the property. Some of these roads will be gated but maintained for management activities or emergency purposes and will be available for passive recreational uses such as hiking. Other roads may be revegetated, screened at road accesses, or left to recover naturally.

#### **3. Vegetation Management**

Management of plant communities will entail control of exotic and invasive plants and the use of prescribed fire. Pest species will be eliminated by pulling, cutting, and /or herbicide applications. Prescribed burns will entail conducting low intensity ground fires, with flames one to two feet high, which will visibly blacken the ground in the oak savanna and prairie restoration areas for a week or two in the spring. Negative impacts to air quality may occur as a result of prescribed burns. The brushing and cutting of woody vegetation will temporarily create slash which will be scattered and/or burned. The effects of the brushing will create a more open understory in the oak savanna restoration areas. Areas within view of the river will be managed to make certain aesthetic values are not negatively impacted by cuttings and slash.



Thinning of the Crandall Pines and other pine plantations will change the appearance of the plantations so they eventually resemble natural pine/oak stands. Dead and downed trees that have fallen through natural causes will not be removed unless they are determined to be a hazard.

### **C. Short-Term, Long-Term and Secondary Environmental Effects**

#### **1. Vegetation Resources**

Natural communities will be enhanced and restored through management activities designed to promote greater biological diversity on the property. The prevailing management strategy will be to allow natural processes to proceed unimpeded. The most intensive vegetation management will occur in the areas classified as Mixed Dry Forest and in the pine plantations. This will involve removing undesirable plant species and thinning of the pine plantations. Short-term impacts will be disturbances associated with cutting and brushing activities and the temporary degradation of scenic qualities in those areas. Naturally-appearing, biologically diverse community types requiring periodic maintenance will be the long-term effect of management.

Canyon and cliff environments will be maintained in their present state. These sensitive environments will be protected for the long term by including them in zones closed to public access. No other active management is will occur in these areas. However, exotic species will be removed where found. The leased properties within these areas will be monitored for maintenance allowed under the lease conditions.

The expanded boundary includes some agricultural land adjacent to the property's western boundary in the Upper Dells. The intent is to protect this land from development over the long term. This land, if acquired, would be allowed to revegetate naturally to create a wider protective buffer to the river corridor. Some land may remain in agricultural use through long-term easement or if development rights are purchased instead of fee title.

#### **2. Endangered Resources**

Management of the high-quality biotic communities in the natural area will provide significant protection to those communities and the rare species they contain. Endangered resources will remain under long-term protection as a result of the site's State Natural Area designation.

The property's cliffs and canyons harbor a of number endangered, threatened, and special concern plant species. Rare plants will receive additional protection from potential negative impacts of public use by including them in closed zones along the river corridor and canyons. Plant populations will be monitored over the long term to track changes in population size and viability. Natural conditions may cause their populations to fluctuate over time. Methods to propagate and outplant some of these species to other locations within the natural area will be explored. Over the long term, management and outplanting may result in a greater number of populations of some rare species.

Likewise, rare animals and their habitat will benefit over the long term from the protection afforded by State Natural Area designation and its attendant stewardship. However, the

protection of rare aquatic organisms, such as mussels and dragonfly nymphs, found in the Wisconsin River will not be increased appreciably as a result of this plan. Management and control of river flow and water quality affecting these organisms is beyond the scope of the master plan.

The amount of recreational activity within the river corridor could be a deterrent to nesting bald eagles which have an active territory in the Lower Dells outside the natural area boundary. Control of boating on the Upper and Lower Dells is outside the purview of this plan. If recreational activity on lands within the natural area disturbs nesting rare species, these areas may be closed temporarily during the nesting season.

This plan calls for adding adjacent areas of important natural community and rare species habitat not currently within the natural area such as that found at Louis' Bluff and the upper reaches of Gulch Creek. These additional lands will also create a larger continuous corridor affording increased protection to a variety of species and will provide a needed buffer to protect key natural features from incompatible land uses.

### **3. Scenic Resources**

The scenic quality of the river corridor and canyon areas will be preserved for the long term through public ownership of these lands. Lands under state ownership will be protected from development and additional acquisition will help to increase the protected area. Any facility developed on the natural area will be well-screened from the river.

Some vegetation management activities may have a temporary impact on river corridor aesthetics such as blackened ground due to prescribed fire or slash from cutting exotic invasive species. Special care will be taken in the scenic corridor to burn and/or scatter cuttings so they are not visible after management is completed.

### **4. Wildlife Resources**

No intensive management activities will specifically benefit wildlife populations. Game and nongame animal populations are expected to fluctuate naturally as is typical of a forested upland community.

Management directed toward natural community enhancement and restoration may have secondary benefits to particular wildlife species. Songbirds and other species that thrive in grassland or savanna habitat are likely to increase in the areas that will be restored to that type. Maturation of forested lands may also benefit certain bird species such as pileated woodpeckers and ovenbirds. On the other hand, species that prefer early successional woodlands may decline over time as that habitat matures. If acquisition of adjacent farmland occurs, natural vegetative succession on portions of this land will benefit species that thrive on edge and grassland areas.

White-tailed deer populations will be substantially reduced through the management described in this plan. Deer Management Unit quotas for this area range from twenty-five to thirty-five deer per square mile. Reductions in the deer population will benefit natural vegetation on the property as well as nearby cropland over the long term.

## 5. Recreational Resources

Prior to state purchase, this property was under private ownership and not open to public use. The river corridor and sandbars have been used intensively by the public for a number of years. This master plan will allow continued public use of the sandbars with restrictions on glass containers, fires, charcoal grills, and hours of use. The uplands will be open with limitations to ensure that public use will be low impact in order to protect sensitive resources.

Public access for recreation is currently available through commercial boat tours that include shore landings at Witches Gulch, Coldwater Canyon, and Stand Rock. The natural area will include new land-based recreational opportunities for nature appreciation, hiking and other passive uses that are not currently available in the uplands. These will include a nature trail, a day-use overlook/picnic area, and a small parking area for access to the Crandall Pines. The overlook area will also be disabled accessible.

Opening the property to the public will increase the potential that damage to resources, littering, and other problems associated with visitor use may occur. Careful consideration has been given in this plan to limit and control public use on the property while still providing quality recreational experiences. The plan will direct visitors towards appropriate areas and away from vulnerable features. Closed zones will be established along the river and in canyon areas to protect sensitive resources. The closed zones will also provide a greater measure of visitor safety by prohibiting public access to steep cliff areas.

Careful oversight will be needed to monitor any potential damaging trends and to control and clean up litter.

Increased recreational opportunities for hunting are provided on the property where there was no public hunting previously. Opening the property to public hunting contains inherent risks to visitor safety and potential user conflicts that will require proper enforcement and monitoring. If major problems occur, hunting on the property may need to be reevaluated in the future.

Development for increased recreational access will include three parking areas, two toilet facilities, a kiosk, and interpretive signs. The nature trail may require some grading and relocation. The construction of these facilities will cause some temporary disturbances and minor disruption to soil and vegetation. These areas will be reseeded and restored as appropriate.

## 6. Property Boundary

Land uses within most of the property boundary will not change substantially through implementation of this plan. Lands that are acquired where there is existing development will be restored to a natural condition. Agricultural lands that are purchased will be restored to native vegetation in part, with the remainder most likely remaining in agricultural use. The intent of purchasing undeveloped lands is to prevent development and incompatible uses.

The project boundary identifies approximately 1,065 acres of land in addition to current state ownership. Since the Department's policy is to purchase from willing sellers only, not all land identified as important for acquisition may actually be purchased. Threats to the natural area

are not only from existing uses but from potential future land use. For this reason the boundary was developed to provide long-term preservation of the unique natural and scenic qualities of the river corridor and adjacent habitat. The expanded project will connect adjacent lands of similar quality, and has the potential to create a large block of protected habitat which will improve management opportunities for a variety of species.

## **7. Historical and Archeological Resources**

One known historical site is contained within the current ownership and others are possibly located within the boundary. Several areas of archeological significance are known to be located within the boundary also. Precautions will be taken to make certain these sites will not be negatively impacted by implementation of the master plan. These precautions may require closing some additional locations to public use.

## **8. Socioeconomic Effects**

Long-term preservation of the natural area will ensure the natural and scenic beauty of the Dells will continue to be enjoyed by visitors to the area for years to come. Increasing the opportunities for public use of the uplands will provide an option for those that desire an alternative to the commercial boat tours or wish to find a quiet spot away from the nearby tourist areas.

The public is not accustomed to having this area open for their use and some have expressed concern that the area may be overtaxed by use. Actual use levels are very difficult to project, consequently visitor use and impact will be monitored over time.

It is not expected that the State Natural Area will draw large numbers of visitors that would not have come to the Dells area anyway. Some increase in visitation to the area may occur from those that are specifically interested in nature appreciation and education. This is not expected to have a significant economic impact on the Dells region.

State ownership of land adjacent to the City of Wisconsin Dells and the Village of Lake Delton will make it difficult for these municipalities to expand their political boundaries in certain areas. Consequently, this could be an impairment to growth of these communities. The Department will cooperate with the municipalities on annexation and easement issues to the extent possible while protecting the values of the natural area.

Lands adjacent to the natural area may increase in value over the long term especially as more land is acquired by the Department. Less land may be available for development in the near vicinity.

## **D. Cumulative Effects of Repeated Actions**

The cumulative effect of protecting and enhancing a larger area adjacent to the river corridor contributes to a broader ecosystem goal of preserving the natural area and adjacent habitat. This project will have the effect of limiting the supply of land available for development near the river corridor. This could drive up the price of land in the vicinity.

### **E. Degree of Risk or Uncertainty in Predicting Impacts**

Not all lands within the boundary are likely to be purchased. There is a risk that new development or other incompatible uses in some areas could severely impact natural and scenic values.

It is difficult to predict the amount and intensity of recreational use the uplands of the natural area will receive when the property is opened for public use. Planned use on the property has been structured to alleviate potential impacts of overuse or abuse. An ongoing monitoring program will assess any changes that are occurring and modifications may need to be made to increasingly regulate use to assure the property is preserved.

### **F. Degree Action May Establish a Precedent**

Acquisitions within the boundary and management activities on the property are not precedent-setting. Management of this property will be consistent with that on other State Natural Areas in Wisconsin.

### **G. Degree of Controversy Over the Effects of the Proposal**

With the exception of the commercial boat tours that lead tourists into Witches Gulch, Coldwater Canyon, and Stand Rock, the uplands in the project area have not been open to public access. There are many people who are interested in using the property. But there are also strong concerns among others that opening this area to the public may result in a loss of natural area qualities, potential damage to sensitive resources, and increased potential for accidental falls from cliffs. Most people seem to favor limited recreational use of the property as long as the resource is protected. Implementation of this plan is intended to accomplish that goal.

The proposal to open the natural area to deer hunting has been somewhat controversial. It is widely recognized that deer are overpopulated and are causing severe vegetation damage in the area. There have been differences of opinion in the most effective methods to control the deer herd. These methods have been evaluated to determine what will work best for this particular property. This plan calls for a deer hunt in accordance with statewide regulations governing the Deer Management Units in which the natural area is currently located. There is also some interest in having a controlled, or managed hunt on the property to alleviate potential public safety concerns and hunter crowding. A deer hunt was held on the property in the fall of 1996 in conjunction with the special zone T season and during the regular gun deer season. No significant complaints or violations were noted.

Boating conflicts between large and small watercraft users, and general crowding of the river in the Dells during parts of the summer season are ongoing concerns. The strongest concerns noted through letters, public meetings, and surveys are conflicts caused by the reckless behavior of some people operating personal watercraft (Jet Skis). Conflicts over boating will likely continue. Navigation rights are protected by the state constitution and are beyond the scope of this plan to resolve. However, this plan contains recommendations for more effective enforcement of boating regulations which may help alleviate these conflicts. The Department does not have the authority to address these conflicts beyond enforcing the existing water laws.

The final public review period for the master plan generated few public comments at the last open house, and only five letters of comment were received during the review period. Most comments were supportive of the management outlined in the master plan and generally reflected issues that were addressed during the planning process. The following specific comments were noted during the review period:

- Concerned that Department staff will not be able to effectively enforce property use restrictions.
- Opposed to small game hunting on the property.
- The natural area should provide an opportunity for the tribes to use it for religious ceremonies.
- The Department should pursue changing the law to give the Department more authority to control boating activities.
- Options should be left open to accommodate the Ice Age Trail in the future.

#### **H. Summary of Issue Identification Activities**

An extensive citizen participation process was an important part of the development of this master plan. This plan was developed over the past year and one half by an eight member Department task force with the assistance of an eighteen member Citizen Advisory Committee and general public input. All landowners within the project boundary were contacted by mail and invited to attend informational open houses. Many comments were received through three public open houses, three types of surveys, and public attendance at all of the advisory committee meetings.

Surveys were conducted through a local Wisconsin Dells newspaper, a regional newspaper and a direct mailing to 175 boaters from Wisconsin and Illinois. This survey was conducted to solicit public input regarding management, use and development of the natural area. The survey was not scientifically conducted, but rather a directed survey to gauge sentiments of people who use or are very interested in the property. The return rate of the surveys was very good, with the following general results:

- Many respondents were concerned with water use conflicts and crowded boating conditions on the river
- There was general consensus that limited recreational use of the property should be available as long as the natural and scenic features are not negatively impacted by any development or use.
- Sentiments towards hunting were mixed, but there was significant opposition.
- There were numerous concerns expressed toward the operation of personal watercraft (Jet Skis).

Press releases were issued at key points in the project, declaring the initiation of the planning process and announcing each open house that was held. Many articles appeared in newspapers around the state which generated a lot of interest and public comments.

The first Citizen Advisory Committee meeting was held in May 1995 which began the public involvement process. Issues were identified through a series of meetings and then management alternatives were developed to offer scenarios to address the issues. Each meeting was also

well attended by local citizens who were not members of the advisory committee but had very strong interest in the natural area. Each advisory committee meeting provided a time near the close of the meeting to receive comments from the public. Following review and evaluation of all the management alternatives, the final management recommendations were proposed as outlined in the draft master plan. The following chronology outlines the public meetings held to develop the plan:

Date	Event
May 23, 1995	First Citizen Advisory Committee (CAC) meeting
June 13, 1995	CAC project tour
July 27, 1995	First public open house
August 24, 1995	CAC meeting
September 21, 1995	CAC meeting
October 19, 1995	CAC meeting
December 14, 1995	CAC meeting
March 14, 1996	CAC meeting (review of draft management alternatives)
March 28, 1996	CAC meeting (continue review of draft management alternatives)
April 17, 1996	Second open house (public review of draft management alternatives)
June 13, 1996	CAC meeting (review partial draft of the proposed master plan)
August 29, 1996	CAC meeting (review of the proposed draft master plan)
September 28, 1996	Final public open house to review the draft master plan

A complete file of public involvement efforts and public comments has been maintained and is available for review upon request.

## VIII. BIBLIOGRAPHY

Clatyon, Lee and John Attig. 1989. *Glacial Lake Wisconsin*. Geological Society of America.

Curtis, John T. 1959. *The Vegetation of Wisconsin*. University of Wisconsin Press, Madison, WI.

Dott, Robert H. Jr., Professor, Emeritus, Department of Geology and Geophysics, University of Wisconsin-Madison. "Geology, Dells of the Wisconsin River State Natural Area.", Unpublished.

Goc, Michael. 1995. *Others Before You: The History of Wisconsin Dells Country*. *Wisconsin Dells, Wisconsin*. Wisconsin Dells Country Historical Society. New Past Press, Inc.

Lurie, Nancy. 1982. *Wisconsin Indians*. The State Historical Society of Wisconsin, Madison, WI.

Martin, Lawrence. 1965. *The Physical Geography of Wisconsin* (Third edition); University of Wisconsin Press, Madison, WI.

Mason, Carol. 1988. *Introduction to Wisconsin Indians: Prehistory to Statehood*. Sheffield Publishing Company, Salem, WI.

Rath, Sara. 1979. *Pioneer Photographer: Wisconsin's H.H. Bennett*. Tamarack Press, Madison, WI.

Reaves, Shiela. 1988. *Wisconsin: Pathways to Prosperity*. Windsor Publications, Northridge, CA.

Weinhold, Frank A. 1993. *Louis' Bluff: The Story of a Wisconsin Dells Landmark*. Frank A. Weinhold, Madison, WI.

*Wisconsin Inventory of Historic Places*, State Historical Society of Wisconsin, Division of Historic Preservation. Checked for known archeological and historic sites.



# IX. COMPLIANCE WITH THE WISCONSIN ENVIRONMENTAL POLICY ACT

Project Name: Dells of the Wisconsin River State Natural Area Master Plan

Counties: Adams, Columbia, Juneau, and Sauk

DECISION (This decision is not final until certified by the appropriate authority)

In accordance with s. 1.11, Stats., and Ch. NR 150, Adm. Code, the Department is authorized and required to determine whether it has complied with s. 1.11, Stats., and Ch. NR 150, Wis. Adm. Code.

Complete either A or B below:

A. EIS Process Not Required



The attached analysis of the expected impacts of this proposal is of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. In my opinion, therefore, an environmental impact statement is not required prior to final action by the Department on this project.

B. Major Action Requiring the Full EIS Process



The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

Signature of Evaluator

*(Signature)*

Date Signed

*12/11/96*

Noted: District Staff Specialist or Bureau Director

*(Signature)*

Date Signed

*12/13/96*

Number of responses to news release or other notice:

CERTIFIED TO BE IN COMPLIANCE WITH NEPA

District Director or Director of BEAR (or designee)

*(Signature)*

Date Signed

*12/12/96*

## NOTICE OF APPEAL RIGHTS

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to section 227.42, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Note: Not all Department decisions respecting environmental impact, such as those involving solid waste or hazardous waste facilities under sections 144.43 to 144.47 and 144.60 to 144.74, Stats., are subject to the contested case hearing provisions of section 227.42, Stats.

This notice is provided pursuant to section 227.48(2), Stats.

## X. APPENDIX - SPECIES LISTS

### Preliminary List of Vascular Plants Dells of the Wisconsin River State Natural Area

Scientific name	Common name
<i>Abies balsamea</i>	Balsam fir
<i>Acer saccharinum</i>	Silver maple
<i>Acer spicatum</i>	Mountain maple
<i>Acer rubrum</i>	Red maple
<i>Achillea millefolium</i>	Yarrow
<i>Actaea rubra</i>	Red baneberry
<i>Actaea alba</i>	White baneberry
<i>Adiantum pedatum</i>	Northern maidenhair fern
<i>Agalinis gattereri</i>	Round-stemmed false foxglove
<i>Alnus incana</i>	Speckled alder
<i>Ambrosia psilostachya</i>	Western ragweed
<i>Amelanchier sp</i>	Juneberry
<i>Amorpha canescens</i>	Lead-plant
<i>Amphicarpaea bracteata</i>	Hog peanut
<i>Andropogon gerardi</i>	Big bluestem
<i>Anemone quinquefolia</i>	Wood anemone
<i>Anemone virginiana</i>	Tall anemone
<i>Anemone cylindrica</i>	Thimbleweed
<i>Anemone quinquefolia</i>	Wood anemone
<i>Antennaria plantaginifolia</i>	Plantain-leaved pussytoes
<i>Antennaria neglecta</i>	Field pussytoes
<i>Apocynum androsaemifolium</i>	Spreading dogbane
<i>Aquilegia canadensis</i>	Wild columbine
<i>Arabis laevigata</i>	Smooth bank cress
<i>Arabis lyrata</i>	Sand cress
<i>Aralia nudicaulis</i>	Wild sarsaparilla
<i>Aralia hispida</i>	Bristly sarsaparilla
<i>Aralia racemosa</i>	Spikenard
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit
<i>Aronia melanocarpa</i>	Black chokeberry
<i>Asarum canadense</i>	Wild ginger
<i>Asclepias exaltata</i>	Poke milkweed
<i>Asplenium trichomanes</i>	Maidenhair spleenwort
<i>Aster macrophyllus</i>	Big-leaved aster
<i>Aster cordifolius</i>	Heart-leaved Aster
<i>Aster linariifolius</i>	Flax-leaved aster
<i>Aster sagittifolius</i>	Arrow-leaved aster
<i>Athyrium thelypteroides</i>	Silvery glade fern
<i>Athyrium filix-femina michauxii</i>	Lady fern

<i>Aureolaria</i> sp	False foxglove
<i>Betula alleghaniensis</i>	Yellow birch
<i>Betula papyrifera</i>	Paper birch
<i>Boehmeria cylindrica</i>	False nettle
<i>Botrychium virginianum</i>	Rattlesnake fern
<i>Brachyelytrum erectum</i>	Long-awned wood grass
<i>Calamagrostis canadensis</i>	Bluejoint grass
<i>Campanula rotundifolia</i>	Harebell
<i>Cardamine pensylvanica</i>	Pennsylvania bitter cress
<i>Cardamine parviflora arenicola</i>	Small-flowered bitter cress
<i>Carex intumescens</i>	Swollen sedge
<i>Carex pensylvanica</i>	Pennsylvania sedge
<i>Carex gracillima</i>	Graceful sedge
<i>Carex crinita</i>	Fringed sedge
<i>Carex blanda</i>	Wood sedge
<i>Carex intumescens</i>	Swollen sedge
<i>Carex stipata</i>	A sedge
<i>Carpinus caroliniana virginiana</i>	Blue beech
<i>Carya ovata</i>	Shagbark hickory
<i>Carya cordiformis</i>	Bitternut hickory
<i>Caulophyllum thalictroides</i>	Blue cohosh
<i>Celastrus scandens</i>	Climbing bittersweet
<i>Chimaphila umbellata</i>	Pipsissewa
<i>Chrysosplenium americanum</i>	Golden saxifrage
<i>Circaea alpina</i>	Small enchanter's nightshade
<i>Circaea lutetiana canadensis</i>	Common enchanter's nightshade
<i>Clintonia borealis</i>	Bluebead
<i>Comandra umbellata</i>	False toadflax
<i>Coptis trifolia groenlandica</i>	Goldthread
<i>Corallorhiza maculata</i>	Spotted coral-root
<i>Cornus alternifolia</i>	Alternate-leaved dogwood
<i>Cornus racemosa</i>	Gray dogwood
<i>Corylus americana</i>	American hazelnut
<i>Cypripedium acaule</i>	Moccasin flower
<i>Cystopteris fragilis</i>	Northern fragile fern
<i>Danthonia spicata</i>	Poverty oat grass
<i>Desmodium glutinosum</i>	Pointed tick-trefoil
<i>Desmodium nudiflorum</i>	Bare-stemmed tick-trefoil
<i>Dicentra cucullaria</i>	Dutchman's breeches
<i>Diervilla lonicera</i>	Bush honeysuckle
<i>Dioscorea villosa</i>	Wild yam
<i>Dirca palustris</i>	Leatherwood
<i>Dryopteris marginalis</i>	Marginal wood-fern
<i>Dryopteris carthusiana</i>	Toothed wood-fern
<i>Dryopteris fragrans</i>	Fragrant fern
<i>Dryopteris intermedia</i>	Fancy wood-fern
<i>Elymus hystrix</i>	Bottlebrush grass

<i>Elymus canadensis</i>	Canada wild rye
<i>Epigaea repens</i>	Trailing arbutus
<i>Equisetum hyemale affine</i>	Common scouring-rush
<i>Eupatorium rugosum</i>	White snakeroot
<i>Euphorbia corollata</i>	Flowering spurge
<i>Euthamia graminifolia</i>	Grass-leaved goldenrod
<i>Fragaria virginiana</i>	Wild strawberry
<i>Fraxinus americana</i>	White ash
<i>Fraxinus nigra</i>	Black ash
<i>Galium lanceolatum</i>	Lance-leaved wild licorice
<i>Galium aparine</i>	Annual bedstraw
<i>Galium circaezans hypomalacum</i>	Wild licorice
<i>Galium triflorum</i>	Sweet-scented bedstraw
<i>Gaultheria procumbens</i>	Wintergreen
<i>Gaylussacia baccata</i>	Huckleberry
<i>Geranium maculatum</i>	Wild geranium
<i>Geum canadense</i>	White avens
<i>Glechoma hederacea</i>	Ground ivy
<i>Glyceria striata</i>	Fowl meadow-grass
<i>Gnaphalium saxicola</i>	Cliff cudweed
<i>Goodyera pubescens</i>	Rattlesnake plantain
<i>Gymnocarpium dryopteris</i>	Oak fern
<i>Hamamelis virginiana</i>	Witch-hazel
<i>Hedyotis longifolia</i>	Long-leaved bluets
<i>Helianthemum canadense</i>	Common rockrose
<i>Helianthus strumosus</i>	Pale-leaved sunflower
<i>Hepatica americana</i>	Round-lobed hepatica
<i>Hesperis matronalis</i>	Dame's rocket
<i>Heuchera richardsonii</i>	Prairie alum-root
<i>Hieracium aurantiacum</i>	Orange hawkweed
<i>Hypoxis hirsuta</i>	Yellow star-grass
<i>Impatiens capensis</i>	Orange jewelweed
<i>Juglans cinerea</i>	Butternut
<i>Juglans nigra</i>	Black walnut
<i>Juniperus virginiana crebra</i>	Red cedar
<i>Krigia biflora</i>	False dandelion
<i>Laportea canadensis</i>	Wood-nettle
<i>Lathyrus venosus</i>	Woodland pea
<i>Ledum groenlandicum</i>	Labrador tea
<i>Lespedeza capitata</i>	Round-headed bush clover
<i>Liatris aspera</i>	Rough blazing star
<i>Lobelia spicata</i>	Pale spiked lobelia
<i>Lobelia inflata</i>	Indian tobacco
<i>Lonicera tatarica</i>	Tartarian honeysuckle
<i>Lupinus perennis</i>	Wild lupine
<i>Luzula multiflora</i>	Common wood-rush
<i>Lycopodium obscurum</i>	Flat-branched ground-pine

<i>Lycopodium annotinum</i>	Stiff clubmoss
<i>Lycopodium lucidulum</i>	Shining clubmoss
<i>Lycopodium complanatum</i>	Northern ground-cedar
<i>Lycopodium obscurum dendroideum</i>	Round-branched ground-pine
<i>Lysimachia quadrifolia</i>	Whorled loosestrife
<i>Maianthemum canadense</i>	Canada Mayflower
<i>Matteuccia struthiopteris</i>	Ostrich fern
<i>Mitchella repens</i>	Partridge berry
<i>Mitella diphylla</i>	Bishop's cap
<i>Monotropa uniflora</i>	Indian pipe
<i>Myosotis scorpioides</i>	Common forget-me-not
<i>Onoclea sensibilis</i>	Sensitive fern
<i>Oryzopsis racemosa</i>	Black-seeded ricegrass
<i>Oryzopsis asperifolia</i>	Rough-leaved ricegrass
<i>Osmorhiza claytoni</i>	Hairy sweet cicely
<i>Osmunda claytoniana</i>	Interrupted fern
<i>Ostrya virginiana</i>	Ironwood
<i>Oxalis violacea</i>	Violet wood-sorrel
<i>Panax quinquefolium</i>	Ginseng
<i>Panicum virgatum</i>	Switch grass
<i>Panicum latifolium</i>	Broad-leaved panic-grass
<i>Parthenocissus vitacea</i>	Grape woodbine
<i>Pedicularis canadensis</i>	Wood betony
<i>Pellaea glabella</i>	Smooth cliff-brake
<i>Phryma leptostachya</i>	Lopseed
<i>Pilea pumila</i>	Clearweed
<i>Pinus banksiana</i>	Jack pine
<i>Pinus resinosa</i>	Red pine
<i>Pinus strobus</i>	White pine
<i>Poa compressa</i>	Canada bluegrass
<i>Poa pratensis</i>	Kentucky bluegrass
<i>Podophyllum peltatum</i>	May-apple
<i>Polemonium reptans</i>	Jacob's ladder
<i>Polygala polygama</i>	Purple milkwort
<i>Polygonatum pubescens</i>	Downy Solomon's seal
<i>Polygonatum biflorum</i>	Smooth Solomon's seal
<i>Polygonum cilinode</i>	Fringed bindweed
<i>Polypodium virginianum</i>	Rock-cap fern
<i>Populus tremuloides</i>	Quaking aspen
<i>Populus grandidentata</i>	Large-toothed aspen
<i>Potentilla simplex</i>	Common cinquefoil
<i>Potentilla fruticosa</i>	Shrubby cinquefoil
<i>Prenanthes alba</i>	Lion's foot
<i>Primula mistassinica</i>	Birds-eye primrose
<i>Prunella vulgaris lanceolata</i>	Self-heal
<i>Prunus virginiana</i>	Choke cherry
<i>Prunus serotina</i>	Wild black cherry

*Pteridium aquilinum latuisculum*  
*Pyrola elliptica*  
*Quercus macrocarpa*  
*Quercus rubra*  
*Quercus alba*  
*Quercus velutina*  
*Ranunculus recurvatus*  
*Ranunculus hispidus nitidus*  
*Ranunculus abortivus*  
*Rhododendron lapponicum*  
*Ribes cynosbati*  
*Robinia pseudo-acacia*  
*Rubus pubescens*  
*Rubus occidentalis*  
*Rudbeckia hirta*  
*Sambucus pubens*  
*Sanguinaria canadensis*  
*Sanicula gregaria*  
*Saxifraga pensylvanica*  
*Schizachne purpurascens*  
*Schizachyrium scoparium*  
*Scutellaria galericulata*  
*Selaginella rupestris*  
*Silene antirrhina*  
*Smilacina stellata*  
*Smilacina racemosa*  
*Smilax ecirrhata*  
*Solidago hispida*  
*Solidago flexicaulis*  
*Solidago sciaphila*  
*Solidago speciosa*  
*Solidago ulmifolia*  
*Solidago nemoralis*  
*Sorbus decora*  
*Spartina pectinata*  
*Spiraea alba*  
*Spiraea tomentosa rosea*  
*Sporobolus heterolepis*  
*Streptopus roseus longipes*  
*Symplocarpus foetidus*  
*Taraxacum officinale*  
*Thalictrum dioicum*  
*Thelypteris phegopteris*  
*Thuja occidentalis*  
*Tilia americana*  
*Toxicodendron radicans*  
*Tradescantia ohimensis*

Bracken fern  
 Large-leaved shinleaf  
 Bur oak  
 Northern red oak  
 White oak  
 Black oak  
 Hooked buttercup  
 Swamp buttercup  
 Small-flowered buttercup  
 Lapland rosebay  
 Prickly wild gooseberry  
 Black locust  
 Dwarf raspberry  
 Black raspberry  
 Black-eyed Susan  
 Red elderberry  
 Bloodroot  
 Clustered black snakeroot  
 Swamp saxifrage  
 False melic grass  
 Little bluestem  
 Marsh skullcap  
 Rock spikemoss  
 Sleepy catchfly  
 Starry false Solomon's seal  
 False Solomon's seal  
 Upright carrion flower  
 Hairy goldenrod  
 Broad-leaved goldenrod  
 Cliff goldenrod  
 Showy goldenrod  
 Elm-leaved goldenrod  
 Old-field goldenrod  
 Showy mountain-ash  
 Prairie cord grass  
 Meadowsweet  
 Hardhack  
 Prairie dropseed  
 Twisted stalk  
 Skunk cabbage  
 Common dandelion  
 Early meadow-rue  
 Narrow beach-fern  
 Arbor vitae  
 Basswood  
 Poison ivy  
 Common spiderwort

*Trientalis borealis*  
*Trillium cernuum*  
*Tsuga canadensis*  
*Ulmus americana*  
*Ulmus rubra*  
*Uvularia grandiflora*  
*Vaccinium myrtilloides*  
*Vaccinium angustifolium*  
*Veronicastrum virginicum*  
*Viburnum rafinesquianum*  
*Viburnum acerifolium*  
*Vicia sp*  
*Viola sagittata*  
*Viola cucullata*  
*Viola pedata*  
*Viola pubescens*  
*Vitis riparia*  
*Woodsia ilvensis*  
*Zanthoxylum americanum*

Starflower  
Nodding trillium  
Hemlock  
American elm  
Slippery elm  
Bellwort  
Canada blueberry  
Early low blueberry  
Culver's root  
Downy arrow-wood  
Maple-leaved arrow-wood  
Vetch  
Arrow-leaved violet  
Blue marsh violet  
Bird's foot violet  
Yellow wood violet  
Riverbank grape  
Cliff-fern  
Prickly ash

Preliminary List of Bryophytes  
Dells of the Wisconsin River State Natural Area

**Mosses**

*Amblystegium serpens*\*  
*Amblystegium varium*\*  
*Anomodon attenuatus*\*  
*Anomodon rostratus*\*  
*Atrichum oerstedianum*\*  
*Aulacomnium palustre*\*  
*Bartramia pomiformis*  
*Bryhnia graminicolor*  
*Bryoerythrophyllum recurvirostre*\*+  
*Bryoxiphium norvegicum*  
*Bryum cf. pseudotriquetrum*  
*Climacium americanum*  
*Dicranella heteromalla*  
*Encalypta ciliata*\*  
*Entodon cladorrhizans*\*  
*Entodon seductrix*\*  
*Gymnostomum aeruginosum*+  
*Hedwigia ciliata*  
*Hygroamblystegium tenax*\*  
*Hypnum curvifolium*\*  
*Leskea gracilescens*\*  
*Philonotis fontana* var. *caespitosa*#  
*Plagiothecium laetum*\*  
*Pleurozium schreberi*\*  
*Pohlia filiformis*\*  
*Polytrichum pallidisetum*#  
*Polytrichum piliferum*  
*Pseudotaxiphyllum distichaceum*#  
*Ptilium crista-castrensis*\*  
*Rhizomnium punctatum*  
*Thuidium delicatulum*  
*Weissia controversa*\*

**Liverworts**

*Bazzania trilobata*\*  
*Cololejeunea biddlecomiae*\*  
*Conocephalum conicum*  
*Frullania inflata*\*  
*Lepidozia reptans*\*  
*Marchantia polymorpha*  
*Nowellia curvifolia*  
*Plagiochila porelloides*  
*Porella pinnata*  
*Preissia quadrata*

\* First Adams County record  
+ First Columbia County record  
# First Wisconsin state record

Compiled by Kevin Lyman  
Milwaukee Public Museum  
1995



**Preliminary List of Birds**  
**Dells of the Wisconsin River State Natural Area**

American Crow	Mourning Warbler
American Goldfinch	Mourning Dove
American Robin	Northern Oriole
Bald Eagle	Ovenbird
Baltimore Oriole	Phoebe
Barred Owl	Pileated Woodpecker
Belted Kingfisher	Pine Warbler
Black-capped Chickadee	Red-bellied Woodpecker
Black-throated Green Warbler	Red-breasted Nuthatch
Blackburnian Warbler	Red-eyed Vireo
Blue Jay	Red-headed Woodpecker
Blue-gray Gnatcatcher	Red-tailed Hawk
Blue-winged Warbler	Red-winged Blackbird
Brown Thrasher	Rose-breasted Grosbeak
Brown-headed Cowbird	Rufous-sided Towhee
Canada Goose	Rough-winged Swallow
Cardinal	Scarlet Tanager
Cedar Waxwing	Solitary Vireo
Chimney Swift	Song Sparrow
Chipping Sparrow	Tree swallow
Common Yellowthroat	Tufted Titmouse
Cooper's Hawk	Turkey Vulture
Crested Flycatcher	Warbling Vireo
Downy Woodpecker	White-breasted Nuthatch
Eastern Bluebird	Wild Turkey
Gray Catbird	Wood Pewee
Great horned owl	Yellow-billed Cuckoo
Hairy Woodpecker	Yellow-throated Vireo
House Wren	Yellow-rumped Warbler
Indigo Bunting	
Louisiana Waterthrush	
Mallard	